YORK BY JOHNSON CONTROLS	AIR-COOLED LIQUID CHILLERS HERMETIC SCROLL	
INSTALLATION, OPERATION, MAINTENANCE	Supersedes 150.66-NM1 (1005)	Form 150.66-NM1 (708)

035-20895-000

YCAL0041EC - YCAL0071EC
AIR-COOLED
SCROLL CHILLERS
STYLE D
WITH IPU II & I/O BOARDS
(60 Hz)
35-60 TON

LD10950

R-22

ISO 9000 REGISTRATION

MANUFACTURER CERTIFIED TO ARI AS COMPLYING WITH CERTIFICATION SECTIONS OF ARI STANDARD 550/590 WATER CHILLING PACKAGED UNITS THE VAPOR COMPRESSION CYCLE

ETL

IMPORTANT!
READ BEFORE PROCEEDING!
GENERAL SAFETY GUIDELINES

This equipment is a relatively complicated apparatus. During installation, operation, maintenance or service, individuals may be exposed to certain components or conditions including, but not limited to: refrigerants, oils, materials under pressure, rotating components, and both high and low voltage. Each of these items has the potential, if misused or handled improperly, to cause bodily injury or death. It is the obligation and responsibility of operating/service personnel to identify and recognize these inherent hazards, protect themselves, and proceed safely in completing their tasks. Failure to comply with any of these requirements could result in serious damage to the equipment and the property in which it is situated, as well as severe personal injury or death to themselves and people at the site.

This document is intended for use by owner-authorized operating/service personnel. It is expected that this individual possesses independent training that will enable them to perform their assigned tasks properly and safely. It is essential that, prior to performing any task on this equipment, this individual shall have read and understood this document and any referenced materials. This individual shall also be familiar with and comply with all applicable governmental standards and regulations pertaining to the task in question.

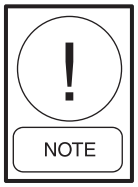
SAFETY SYMBOLS

The following symbols are used in this document to alert the reader to areas of potential hazard:

DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

CAUTION identifies a hazard which could lead to damage to the machine, damage to other equipment and/or environmental pollution. Usually an instruction will be given, together with a brief explanation.

WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



NOTE is used to highlight additional information which may be helpful to you.

External wiring, unless specified as an optional connection in the manufacturer's product line, is NOT to be connected inside the micro panel cabinet. Devices such as relays, switches, transducers and controls may NOT be installed inside the panel. NO external wiring is allowed to be run through the micro panel. All wiring must be in accordance with YORK's published specifications and must be performed ONLY by qualified YORK personnel. YORK will not be responsible for damages/problems resulting from improper connections to the controls or application of improper control signals. Failure to follow this will void the manufacturer's warranty and cause serious damage to property or injury to persons.

CHANGEABILITY OF THIS DOCUMENT

In complying with YORK's policy for continuous product improvement, the information contained in this document is subject to change without notice. While YORK makes no commitment to update or provide current information automatically to the manual owner, that information, if applicable, can be obtained by contacting the nearest YORK Engineered Systems Service office.

It is the responsibility of operating/service personnel to verify the applicability of these documents to the equipment in question. If there is any question in the mind of operating/service personnel as to the applicability of these documents, then prior to working on the equipment, they should verify with the owner whether the equipment has been modified and if current literature is available.

TABLE OF CONTENTS

GENERAL SAFETY GUIDELINES 2
TABLE OF CONTENTS 4
LIST OF FIGURES 9
LIST OF TABLES 10
SECTION 1 - GENERAL CHILLER INFORMATION & SAFETY 13
INTRODUCTION 13
WARRANTY 13
SAFETY 13
Standards for Safety 13
RESPONSIBILITY FOR SAFETY 14
ABOUT THIS MANUAL 14
MISUSE OF EQUIPMENT 14
Suitability for Application 14
Structural Support 14
Mechanical Strength 15
General Access 15
Pressure Systems 15
Electrical 15
Rotating Parts 15
Sharp Edges 15
Refrigerants and Oils 15
High Temperature and Pressure Cleaning 15
Emergency Shutdown 15
SECTION 2 - PRODUCT DESCRIPTION 16
INTRODUCTION 16
GENERAL SYSTEM DESCRIPTION 16
Compressors 16
Cooler 16
Condenser 17
Millennium Control Center 17
Power Panel 18
ACCESSORIES AND OPTIONS 19
Power Options: 19
Control Options: 19
Compressor, Piping, Evaporator Options 20
Condenser and Cabinet Options 20
Sound Reduction Options 21
UNIT COMPONENTS 22
CONTROL / POWER PANEL COMPONENTS 23
PRODUCT IDENTIFICATION NUMBER (PIN) 24
UNIT NOMENCLATURE 24
BASIC UNIT NOMENCLATURE 24
REFRIGERANT FLOW DIAGRAM 29
SECTION 3 - HANDLING AND STORAGE 30
DELIVERY AND STORAGE 30
INSPECTION 30
MOVING THE CHILLER 30
Lifting Weights 30
UNIT RIGGING 31

TABLE OF CONTENTS (CONT'D)

SECTION 4 - INSTALLATION 32
- INSTALLATION CHECKLIST 32
- HANDLING 32
- INSPECTION 32
- LOCATION AND CLEARANCES 32
  - Foundation 33
  - Ground Level Locations 33
  - Rooftop Locations 33
  - Noise Sensitive Locations 33
- SPRING ISOLATORS (OPTIONAL) 33
- COMPRESSOR MOUNTING 33
- REMOTE COOLER OPTION 33
- CHILLED LIQUID PIPING 33
- DUCT WORK CONNECTION 34
- WIRING 34
  - Evaporator Pump Start Contacts 35
  - System Run Contacts 35
  - Alarm Status Contacts 35
  - Remote Start/Stop Contacts 35
  - Remote Emergency Cutoff 35
  - PWM Input 35
  - Load Limit Input 35
  - Flow Switch Input 35
- COMPRESSOR HEATERS 35
- SINGLE-POINT SUPPLY CONNECTION – TERMINAL BLOCK, NON-FUSED DISCONNECT SWITCH OR CIRCUIT BREAKER (0041 - 0071) 36
- SINGLE-POINT SUPPLY CONNECTION 36
- CONTROL WIRING 37

SECTION 5 - COMMISSIONING 38
- PREPARATION – POWER OFF 38
  - Inspection 38
  - Refrigerant Charge 38
  - Service and Oil Line Valves 38
  - Compressor Oil 38
  - Fans 38
  - Isolation / Protection 38
  - Control Panel 38
  - Power Connections 38
  - Grounding 39
  - Supply Voltage 39
- PREPARATION – POWER ON 39
  - Switch Settings 39
  - Compressor Heaters 39
  - Water System 39
  - Flow Switch 39
  - Temperature Sensor(s) 39
- EQUIPMENT STARTUP CHECKLIST 40
  - Checking the System Prior To Initial Start (No Power) 40
  - Compressor Heaters (Power ON – 24 Hours Prior To Start) 40
  - Panel Checks (Power ON – Both Unit Switches OFF) 40

TABLE OF CONTENTS (CONT'D)

SETPOINTS ENTRY LIST 41
CHECKING SUPERHEAT AND SUBCOOLING 42
LEAK CHECKING 42
UNIT OPERATING SEQUENCE 43
SECTION 6 - TECHNICAL DATA 44
OPERATIONAL LIMITATIONS (ENGLISH) 44
Temperatures and Flows 44
Voltage Limitations 44
Ethylene Glycol Correction Factors 45
OPERATIONAL LIMITATIONS (SI) 46
Temperatures and Flows 46
Voltage Limitations 46
Ethylene Glycol Correction Factors 47
PHYSICAL DATA (ENGLISH) 48
SOUND DATA (ENGLISH) 50
ELCTRICAL DATA (ENGLISH) 52
ELECTRICAL NOTES AND LEGEND 55
WIRING DIAGRAMS 56
CONNECTION DIAGRAMS 63
DIMENSIONS - (ENGLISH) 66
DIMENSIONS - (SI) 80
TECHNICAL DATA - CLEARANCES 94
ISOLATORS 95
SECTION 7 - UNIT CONTROLS 101
INTRODUCTION 101
MICROPROCESSOR BOARD 101
UNIT SWITCH 102
DISPLAY 102
KEYPAD 102
BATTERY BACK-UP 102
TRANSFORMER 102
SINGLE SYSTEM SELECT ANDPROGRAMMING # OF COMPRESSORS 102
"STATUS" KEY 103
Unit Status 103
General Status Messages 103
Fault safety Status Messages 105
System Safeties 105
Unit Safeties: 107
Unit Warning 107
STATUS KEY MESSAGES QUICK REFERENCE LIST 108
DISPLAY/PRINT KEYS 109
Oper Data Key 109
Operation Data Quick Reference List 112
Print Key 113
Operating Data Printout 113
History Printout 114
History Displays 114
Software Version 116

TABLE OF CONTENTS (CONT'D)

"ENTRY" KEYS 117
Up and Down Arrow Keys 117
Enter/Adv Key 117
"SETPOINTS" KEYS 118
Cooling Setpoints 118
Leaving Chilled Liquid Control 118
Return Chilled Liquid Control 119
Remote Setpoint Control 119
Schedule/advance Day Key 119
Program Key 121
System Trip Volts 122
Unit Trip Volts 123
Program Key Limits and Defaults 124
Setpoints Quick Reference List 125
"UNIT" KEYS 126
Options Key 126
CLOCK 130
UNIT KEYS PROGRAMMING QUICK REFERENCE LIST 131
SECTION 8 - UNIT OPERATION 132
CAPACITY CONTROL 132
SUCTION PRESSURE LIMIT CONTROLS 132
DISCHARGE PRESSURE LIMIT CONTROLS 132
LEAVING CHILLED LIQUID CONTROL 132
LEAVING CHILLED LIQUID CONTROLOVERRIDE TO REDUCE CYCLING 133
LEAVING CHILLED LIQUID SYSTEM LEAD/LAG AND COMPRESSOR SEQUENCING 133
RETURN CHILLED LIQUID CONTROL 133
RETURN CHILLLED LIQUID SYSTEM LEAD/LAG AND COMPRESSOR SEQUENCING 134
ANTI-RECYCLE TIMER 135
ANTI-COINCIDENCE TIMER 135
EVAPORATOR PUMP CONTROL 135
EVAPORATOR HEATER CONTROL 135
PUMPDOWN CONTROL 136
CONDENSER FAN CONTROL 136
LOW AMBIENT FAN CONTROL OPTION 138
General 138
Configuration (Jumpers and Potentiometers) 139
Wiring 140
PROGRAMMING 141
LOAD LIMITING 141
COMPRESSOR RUN STATUS 142
ALARM STATUS 142
EMS-PWM REMOTE TEMPERATURE RESET 142
BAS/EMS TEMPERATURE RESET OPTION 143

TABLE OF CONTENTS (CONT'D)

SECTION 9 - SERVICE AND TROUBLESHOOTING 145
CLEARING HISTORY BUFFERS 145
SERVICE MODE – OUTPUTS 145
SERVICE MODE – CHILLER CONFIGURATION 145
SERVICE MODE – INPUTS 146
CONTROL INPUTS/OUTPUTS 147
IPU II & I/O LAYOUT 148
CHECKING INPUTS AND OUTPUTS 149
Digital Inputs 149
Analog Inputs – Temperature 149
Outside Air Sensor 149
Liquid & Refrigerant Sensor Test Points 150
Analog Inputs – Pressure 151
Digital Outputs 152
OPTIONAL PRINTER INSTALLATION 153
Parts 153
Assembly and Wiring 153
Obtaining a Printout 153
TROUBLESHOOTING 154
SECTION 10 - MAINTENANCE 157
IMPORTANT 157
COMPRESSORS 157
Oil Level check 157
Oil Analysis 157
CONDENSER FAN MOTORS 157
CONDENSER COILS 157
OPERATING PARAMETERS 157
ON-BOARD BATTERY BACK-UP 157
PLATE AND FRAME HEAT EXCHANGER (EVAPORATOR) HEATER 157
OVERALL UNIT INSPECTION 158
ISN CONTROL 159
Received Data (Control Data) 159
Transmitted Data 159
BACNET AND MODBUS DATA COMMUNICATION 162

LIST OF FIGURES

FIG. 1 – REFRIGERANT FLOW DIAGRAM....29
FIG. 2 – SINGLE-POINT SUPPLY CONNECTION – TERMINAL BLOCK, NON-FUSED DISCONNECT SWITCH OR CIRCUIT BREAKER (0041 - 0071)....36
FIG. 3 – CONTROL WIRING....37
FIG. 4 – CONTROL CIRCUIT, DUAL....56
FIG. 5 – CONTROL CIRCUIT, DUAL....58
FIG. 6 – POWER CIRCUIT, DUAL....60
FIG. 7 – POWER CIRCUIT, DUAL....61
FIG. 8 – WIRING DETAILS....62
FIG. 9 – CONNECTION DIAGRAM....63
FIG. 10 – CONNECTION DIAGRAM....64
FIG. 11 – CONNECTION DIAGRAM MICROBOARD (PARTIAL)....65
FIG. 12 – UNIT CLEARANCES....94
FIG. 13 – LEAVING WATER TEMPERATURE CONTROL EXAMPLE....133
FIG. 14 – SETPOINT ADJUST....133
FIG. 15 – YCAL0041 – YCAL0071 FAN LOCATION (TYPICAL)....137
FIG. 16 – TYPICAL INVERTER LOCATION....138
FIG. 17 – INVERTER ENCLOSURE....138
FIG. 18 – POTENTIOMETER SETTINGS....139
FIG. 19 – INVERTER POWER WIRING SCHEMATIC....140
FIG. 20 – INVERTER WIRING....140
FIG. 21 – FIELD AND FACTORY ELECTRICAL CONNECTIONS OPTIONAL REMOTE TEMPERATURE RESET BOARD....144
FIG. 22 – IPU II & I/O LAYOUT....148
FIG. 23 – MICROBOARD RELAY CONTACT ARCHITECTURE....152
FIG. 24 – PRINTER TO MICROBOARD ELECTRICAL CONNECTIONS....153

LIST OF TABLES

TABLE 1 – SETPOINTS ENTRY LIST....41
TABLE 2 – TEMPERATURES AND FLOWS....44
TABLE 3 – VOLTAGE LIMITATIONS....44
TABLE 4 – ETHYLENE GLYCOL CORRECTION FACTORS....45
TABLE 5 – TEMPERATURES AND FLOWS (SI)....46
TABLE 6 – VOLTAGE LIMITATIONS....46
TABLE 7 – ETHYLENE GLYCOL CORRECTION FACTORS....47
TABLE 8 – PHYSICAL DATA (ENGLISH)....48
TABLE 9 – SOUND DATA (ENGLISH)....50
TABLE 10 – ELECTRICAL DATA (ENGLISH)....52
TABLE 11 – MICRO PANEL POWER SUPPLY....54
TABLE 12 – VOLTAGE RANGE....54
TABLE 13 – STATUS KEY MESSAGES QUICK REFERENCE LIST....108
TABLE 14 – OPERATION DATA....112
TABLE 15 – COOLING SETPOINTS, PROGRAMMABLE LIMITS AND DEFAULTS....120
TABLE 16 – PROGRAM KEY LIMITS AND DEFAULTS....124
TABLE 17 – SETPOINTS QUICK REFERENCE LIST....125
TABLE 18 – UNIT KEYS PROGRAMMING QUICK REFERENCE LIST....131
TABLE 19 – COMPRESSOR STAGING FOR RETURN WATER CONTROL....134
TABLE 20 – RETURN CHILLED LIQUID CONTROL FOR 4 COMPRESSORS (6 STEPS)....135
TABLE 21 – RETURN CHILLED LIQUID CONTROL FOR 4 COMPRESSORS (6 STEPS)....136
TABLE 22 – YCAL0041 – YCAL0071 CONDENSER FAN CONTROL USING OUTDOOR AMBIENT TEMPERATURE AND DISCHARGE PRESSURE (DISCHARGE PRESSURE CONTROLS WILL NOT FUNCTION AND FAN CONTROL WILL BE BASED ON AMBIENT TEMPERATURES ONLY, UNLESS THE OPTIONAL DISCHARGE PRESSURE....137
TABLE 23 – YCAL0041 – YCAL0071 CONDENSER FAN CONTROL USING DISCHARGE PRESSURE ONLY....137
TABLE 24 – INVERTER OPTION CONDENSER FAN CONTROL OPERATION....141
TABLE 25 – COMPRESSOR OPERATION – LOAD LIMITING....142
TABLE 26 – MICROBOARD DIGITAL INPUTS....147
TABLE 27 – MICROBOARD DIGITAL OUTPUTS....147
TABLE 28 – MICROBOARD ANALOG INPUTS....147
TABLE 29 – MICROBOARD ANALOG OUTPUTS....147
TABLE 30 – OUTDOOR AIR SENSOR TEMPERATURE/VOLTAGE/ RESISTANCE CORRELATION....149
TABLE 31 – ENTERING/LEAVING CHILLED LIQUID TEMP. SENSOR, COOLER INLET TEMPERATURE SENSOR, AND SUCTION TEMPERATURE SENSOR: TEMPERATURE/VOLTAGE CORRELATION....150
TABLE 32 – TROUBLESHOOTING....154

LIST OF TABLES (CONT'D)

TABLE 33 – ISN RECEIVED DATA 159
TABLE 34 – ISN TRANSMITTED DATA 159
TABLE 35 – ISN OPERATIONAL AND FAULT CODES 161
TABLE 36 – MINIMUM, MAXIMUM AND DEFAULT VALUES 163
TABLE 37 – REAL TIME ERROR NUMBERS 163

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 1 - GENERAL CHILLER INFORMATION & SAFETY

INTRODUCTION

YORK YCAL0041-0071 chillers are manufactured to the highest design and construction standards to ensure high performance, reliability and adaptability to all types of air conditioning installations.

The unit is intended for cooling water or glycol solutions and is not suitable for purposes other than those specified in this manual.

This manual contains all the information required for correct installation and commissioning of the unit, together with operating and maintenance instructions. The manuals should be read thoroughly before attempting to operate or service the unit.

All procedures detailed in the manuals, including installation, commissioning and maintenance tasks must only be performed by suitably trained and qualified personnel.

The manufacturer will not be liable for any injury or damage caused by incorrect installation, commissioning, operation or maintenance resulting from a failure to follow the procedures and instructions detailed in the manuals.

WARRANTY

YORK International warrants all equipment and materials against defects in workmanship and materials for a period of eighteen months from date of shipment, unless labor or extended warranty has been purchased as part of the contract.

The warranty is limited to parts only replacement and shipping of any faulty part, or sub-assembly, which has failed due to poor quality or manufacturing errors. All claims must be supported by evidence that the failure has occurred within the warranty period, and that the unit has been operated within the designed parameters specified.

All warranty claims must specify the unit model, serial number, order number and run hours/starts. Model and serial number information is printed on the unit identification plate.

The unit warranty will be void if any modification to the unit is carried out without prior written approval from YORK International.

For warranty purposes, the following conditions must be satisfied:

- The initial start of the unit must be carried out by trained personnel from an Authorized YORK Service Center *(see Commissioning Page 38).*
- Only genuine YORK approved spare parts, oils, coolants, and refrigerants must be used.
- All the scheduled maintenance operations detailed in this manual must be performed at the specified times by suitably trained and qualified personnel *(see Maintenance Section, Page 157).*
- Failure to satisfy any of these conditions will automatically void the warranty *(see Warranty Policy).*

SAFETY

Standards for Safety

YCAL chillers are designed and built within an ISO 9002 accredited design and manufacturing organization. The chillers comply with the applicable sections of the following Standards and Codes:

- ANSI/ASHRAE Standard 15- Safety Code for Mechanical Refrigeration.
- ANSI/NFPA Standard 70- National Electrical Code (N.E.C.).
- ASME Boiler and Pressure Vessel Code- Section VIII Division 1.
- ARI Standard 550/590-98- Water Chilling Packages Using the Vapor Compression Cycle.
- ASHRAE 90.1- Energy Efficiency compliance.
- ARI 370- Sound Rating of Large Outdoor Refrigeration and Air Conditioning Equipment.

In addition, the chillers conform to Underwriters Laboratories (U.L.) for construction of chillers and provide U.L./cU.L. Listing Label.

RESPONSIBILITY FOR SAFETY

Every care has been taken in the design and manufacture of the unit to ensure compliance with the safety requirements listed above. However, the individual operating or working on any machinery is primarily responsible for:

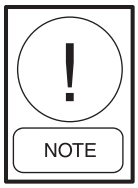
- Personal safety, safety of other personnel, and the machinery.
- Correct utilization of the machinery in accordance with the procedures detailed in the manuals.

ABOUT THIS MANUAL

The following terms are used in this document to alert the reader to areas of potential hazard.

A ***WARNING*** is given in this document to identify a hazard, which could lead to personal injury. Usually an instruction will be given, together with a brief explanation and the possible result of ignoring the instruction.

A ***CAUTION*** identifies a hazard which could lead to damage to the machine, damage to other equipment and/or environmental pollution. Usually an instruction will be given, together with a brief explanation and the possible result of ignoring the instruction.



A ***NOTE*** is used to highlight additional information, which may be helpful to you but where there are no special safety implications.
The contents of this manual include suggested best working practices and procedures. These are issued for guidance only, and they do not take precedence over the above stated individual responsibility and/or local safety regulations.

This manual and any other document supplied with the unit are the property of YORK which reserves all rights. They may not be reproduced, in whole or in part, without prior written authorization from an authorized YORK representative.

MISUSE OF EQUIPMENT

Suitability for Application

The unit is intended for cooling water or glycol solutions and is not suitable for purposes other than those specified in these instructions. Any use of the equipment other than its intended use, or operation of the equipment contrary to the relevant procedures may result in injury to the operator, or damage to the equipment.

The unit must not be operated outside the design parameters specified in this manual.

Structural Support

Structural support of the unit must be provided as indicated in these instructions. Failure to provide proper support may result in injury to the operator, or damage to the equipment and/or building.

Mechanical Strength

The unit is not designed to withstand loads or stresses from adjacent equipment, pipework or structures. Additional components must not be mounted on the unit. Any such extraneous loads may cause structural failure and may result in injury to the operator, or damage to the equipment.

General Access

There are a number of areas and features, which may be a hazard and potentially cause injury when working on the unit unless suitable safety precautions are taken. It is important to ensure access to the unit is restricted to suitably qualified persons who are familiar with the potential hazards and precautions necessary for safe operation and maintenance of equipment containing high temperatures, pressures and voltages.

Pressure Systems

The unit contains refrigerant vapor and liquid under pressure, release of which can be a danger and cause injury. The user should ensure that care is taken during installation, operation and maintenance to avoid damage to the pressure system. No attempt should be made to gain access to the component parts of the pressure system other than by suitably trained and qualified personnel.

Electrical

The unit must be grounded. No installation or maintenance work should be attempted on the electrical equipment without first switching power OFF, isolating and locking-off the power supply. Servicing and maintenance on live equipment must only be performed by suitably trained and qualified personnel. No attempt should be made to gain access to the control panel or electrical enclosures during normal operation of the unit.

Rotating Parts

Fan guards must be fitted at all times and not removed unless the power supply has been isolated. If ductwork is to be fitted, requiring the wire fan guards to be removed, alternative safety measures must be taken to protect against the risk of injury from rotating fans.

Sharp Edges

The fins on the air-cooled condenser coils have sharp metal edges. Reasonable care should be taken when working in contact with the coils to avoid the risk of minor abrasions and lacerations. The use of gloves is recommended.

Frame rails, brakes, and other components may also have sharp edges. Reasonable care should be taken when working in contact with any components to avoid risk of minor abrasions and lacerations.

Refrigerants and Oils

Refrigerants and oils used in the unit are generally nontoxic, non-flammable and non-corrosive, and pose no special safety hazards. Use of gloves and safety glasses is, however, recommended when working on the unit. The build up of refrigerant vapor, from a leak for example, does pose a risk of asphyxiation in confined or enclosed spaces and attention should be given to good ventilation.

High Temperature and Pressure Cleaning

High temperature and pressure cleaning methods (e.g. steam cleaning) should not be used on any part of the pressure system as this may cause operation of the pressure relief device(s). Detergents and solvents, which may cause corrosion, should also be avoided.

Emergency Shutdown

In case of emergency, the control panel is fitted with a Unit Switch to stop the unit in an emergency. When operated, it removes the low voltage 120 VAC electrical supply from the inverter system, thus shutting down the unit.

SECTION 2 - PRODUCT DESCRIPTION

LD10950

INTRODUCTION

YORK Millennium® Air-Cooled Scroll Chillers provide chilled water for all air conditioning applications using central station air handling or terminal units. They are completely self-contained and are designed for outdoor (roof or ground level) installation. Each unit includes hermetic scroll compressors, a liquid cooler, air cooled condenser, and a weather resistant microprocessor control center, all mounted on a pressed steel base.

The units are completely assembled with all interconnecting refrigerant piping and internal wiring, ready for field installation.

Prior to delivery, the unit is pressure-tested, evacuated, and fully charged with Refrigerant-22 (HCFC-22) and includes an initial oil charge. After assembly, a complete operational test is performed with water flowing through the cooler to assure that the refrigeration circuit operates correctly.

The unit structure is heavy-gauge, galvanized steel. This galvanized steel is coated with baked-on powder paint, which, when subjected to ASTM B117 1000 hour, salt spray testing, yields a minimum ASTM 1654 rating of "6". Corrosion resistant wire mesh panels are added to protect the condenser coil from incidental damage and restrict unauthorized access to internal components. Units are designed in accordance with NFPA 70 (National Electric Code), ASHRAE/ANSI 15 Safety code for mechanical refrigeration, ASME, Listed and labeled with Intertek Testing Services (ETL) and rated in accordance with ARI Standard 550/590-2003.

All exposed power wiring is routed through liquid-tight, non-metallic conduit.

GENERAL SYSTEM DESCRIPTION

Compressors

The chiller has suction-gas cooled, hermetic, scroll compressors. The YCAL compressors incorporate a compliant scroll design in both the axial and radial direction. All rotating parts are statically and dynamically balanced. A large internal volume and oil reservoir provides greater liquid tolerance. Compressor crankcase heaters are also included for extra protection against liquid migration.

Cooler

The Brazed Plate Heat Exchanger is equipped with a heater controlled by the microprocessor. The heater provides freeze protection for the cooler down to -20°F (-29°C) ambient. The cooler is covered with 3/4" (19mm) flexible, closed-cell, foam insulation (K~0.25).

Brazed plate heat exchangers shall be UL (Underwriters Laboratories) listed. Installing contractor must include accommodations in the chilled water piping to allow proper drainage and venting of the heat exchanger. Water inlet and outlet connections are grooved for compatibility with factory supplied victaulic connections.

A strainer with a mesh size between .5 and 1.5 mm (40 mesh) is recommended upstream of the heat exchanger to prevent clogging.

Condenser

Coils – Fin and tube condenser coils of seamless, internally-enhanced, high-condensing-coefficient, corrosion resistant copper tubes are arranged in staggered rows, mechanically expanded into aluminum fins. Integral subcooling is included. The design working pressure of the coil is 450 PSIG (31 bar).

Low Sound Fans – The condenser fans are composed of corrosion resistant aluminum hub and glass-fiber reinforced composite blades molded into a low noise airfoil section. They are designed for maximum efficiency and are statically and dynamically balanced for vibration free operation. They are directly driven by independent motors, and positioned for vertical air discharge. All blades are statically and dynamically balanced for vibration-free operation. The fan guards are constructed of heavy-gauge, rust-resistant, PVC coated steel wire.

Motors – The fan motors are Totally Enclosed Air-Over, squirrel-cage type, current protected. They feature ball bearings that are double-sealed and permanently lubricated.

Millennium Control Center

All controls are contained in a NEMA 3R/12 (and equivalent to IP55*) cabinet with hinged outer door and includes:

Liquid Crystal Display with Light Emitting Diode back-lighting for outdoor viewing:

- Two display lines
- Twenty characters per line

Color coded 12-button non-tactile keypad with sections for:

DISPLAY/PRINT of typical information:

- Chilled liquid temperatures
- Ambient temperature
- System pressures (each circuit)
- Operating hours and starts (each compressor)
- Print calls up to the liquid crystal display
- Operating data for the systems
- History of fault shutdown data for up to the last six fault shutdown conditions.
- An RS-232 port, in conjunction with this press-to-print button, is provided to permit the capability of hard copy print-outs via a separate printer (by others).

ENTRY section to:

ENTER setpoints or modify system values.

SETPOINTS updating can be performed to:

- Chilled liquid temperature setpoint and range
- Remote reset temperature range
- Set daily schedule/holiday for start/stop
- Manual override for servicing
- Low and high ambient cutouts
- Number of compressors
- Low liquid temperature cutout
- Low suction pressure cutout
- High discharge pressure cutout
- Anti-recycle timer (compressor start cycle time)
- Anti-coincident timer (delay compressor starts)

UNIT section to:

- Set time
- Set unit options

UNIT ON/OFF switch

The microprocessor control center is capable of displaying the following:

- Return and leaving liquid temperature
- Low leaving liquid temperature cutout setting
- Low ambient temperature cutout setting
- Outdoor air temperature
- English or Metric data
- Suction pressure cutout setting
- Each system suction pressure

- Discharge pressure (optional)
- Liquid Temperature Reset via a YORK ISN DDC or Building Automation System (by others) via:

  - a pulse width modulated (PWM) input as standard.

  - a 4-20 milliamp or 0 -10 VDC input, or contact closure with the optional B.A.S. interface option.
- Anti-recycle timer status for each system
- Anti-coincident system start timer condition
- Compressor run status
- No cooling load condition
- Day, date and time
- Daily start/stop times
- Holiday status
- Automatic or manual system lead/lag control
- Lead system definition
- Compressor starts & operating hours (each compressor)
- Status of hot gas valves, evaporator heater and fan operation
- Run permissive status
- Number of compressors running
- Liquid solenoid valve status
- Load & unload timer status
- Water pump status

Provisions are included for: pumpdown at shutdown; optional remote chilled water temperature reset and two steps of demand load limiting from an external building automation system. Unit alarm contacts are standard.

The operating program is stored in non-volatile memory (EPROM) to eliminate chiller failure due to AC powered failure/battery discharge. Programmed setpoints are retained in lithium battery-backed RTC memory for 5 years minimum.

Power Panel

Each panel contains:

- Compressor power terminals
- Compressor motor starting contactors per l.E.C.**
- Control power terminals to accept incoming for 115-1-60 control power
- Fan contactors & overload current protection

The power wiring is routed through liquid-tight conduit to the compressors and fans.

* Intensity of Protection European Standard
** International Electrotechnical Commission

ACCESSORIES AND OPTIONS

POWER OPTIONS:

COMPRESSOR POWER CONNECTION – Single-point (YCAL0041-0071) terminal block connection is provided as standard. The following power connections are available as options. *(See electrical data for specific voltage and options availability)* (**Factory-Mounted**).

SINGLE-POINT SUPPLY TERMINAL BLOCK – (standard on YCAL0041 - 0071 models) Includes enclosure, terminal-block and interconnecting wiring to the compressors. Separate external protection must be supplied, by others, in the incoming compressor-power wiring. (Do not include this option if either the Single Point Non Fused Disconnect Switch or Single-Point Circuit Breaker options have been included).

SINGLE-POINT NON-FUSED DISCONNECT SWITCH – Unit-mounted disconnect switch with external, lockable handle (in compliance with Article 440-14 of N.E.C.), can be supplied to isolate the unit power voltage for servicing. Separate external fusing must be supplied, by others in the power wiring, which must comply with the National Electrical Code and/or local codes.

SINGLE-POINT CIRCUIT BREAKER – A unit mounted circuit breaker with external, lockable handle (in compliance with N.E.C. Article 440-14), can be supplied to isolate the power voltage for servicing (this option includes the Single-Point Power connection).

CONTROL TRANSFORMER – Converts unit power voltage to 115-1-60 (0.5 or 1.0 KVA capacity). Factory mounting includes primary and secondary wiring between the transformer and the control panel (**Factory-Mounted**).

POWER FACTOR CORRECTION CAPACITORS – Will correct unit compressor power factors to a 0.90-0.95 (**Factory-Mounted**).

CONTROL OPTIONS:

AMBIENT KIT (LOW) – Units will operate to 25°F (-4°C). This accessory includes all necessary components to permit chiller operation to 0°F (-18°C). (This option includes the Discharge Pressure Transducer / Readout Capability option). For proper head pressure control in applications below 25°F (-4°C), where wind gusts may exceed five mph, it is recommended that Optional Condenser Louvered Enclosure Panels also be included (**Factory-Mounted**).

AMBIENT KIT (HIGH) – Required if units are to operate when the ambient temperature is above 115°F (46°C). Includes discharge pressure transducers. (This option includes the Discharge Pressure Transducer / Readout Capability option) (**Field-Mounted**).

BUILDING AUTOMATION SYSTEM INTERFACE – The factory addition of a Printed Circuit Board to accept a 4-20 milliamp, 0-10VDC or contact closure input to reset the leaving chiller liquid temperature from a Building Automation System. (Only one of following options can be offered on a unit at a time: BAS, Remote Control Panel or Multi-unit Sequence Control) (**Factory-Mounted**). (The standard unit capabilities include remote start/stop, remote water temperature reset via a PWM input signal or up to two steps of demand (load) limiting depending on model). (The standard control panel can be directly connected to a YORK Building Automated System via the standard onboard RS485 communication port).

LANGUAGE LCD AND KEYPAD DISPLAY – Spanish, French, and German unit LCD controls and keypad displays are available. Standard language is English.

DISCHARGE PRESSURE TRANSDUCERS AND READOUT CAPABILITY – The addition of pressure transducers allows models to sense and display discharge pressure. This is recommended for brine chilling applications. (This option is included with either the low or high ambient kits) (**Factory-Mounted**).

- **Suction Pressure Transducers**: Permits unit to sense and display suction pressure. This capability is standard on YCAL0041-0071 models.

MOTOR CURRENT MODULE – Capable of monitoring compressor motor current. Provides extra protection against compressor reverse rotation, phase-loss and phase imbalance. Option consists of one module per electrical system (**Factory-Mounted**).

OPTIVIEW REMOTE CONTROL PANEL - Graphical interface panel to remotely control and monitor up to 8 different units. *(Refer to form 201.18-SG4 for detailed information).*

MULTI-UNIT SEQUENCING – A separate Sequencing Control Center is provided to handle sequencing control of up to eight chillers in parallel based on mixed liquid temperature (interconnecting wiring by others). (Only one of following options can be offered on a unit at a time: BAS, Remote Control Panel or Multi-unit Sequence Control) (**Factory-Mounted**).

COMPRESSOR, PIPING, EVAPORATOR OPTIONS

LOW TEMPERATURE BRINE – Required for brine chilling below 30°F (-1°C) leaving brine temperature for YCAL0041 - 0071 models. Option includes resized thermal expansion valve (**Factory-Mounted**).

CHICAGO CODE RELIEF VALVES – Unit will be provided with relief valves to meet Chicago code requirements (**Factory-Mounted**).

SERVICE ISOLATION VALVE – Service suction and discharge (ball type) isolation valves are added to unit per system. This option also includes a system high pressure relief valve in compliance with ASHRAE 15 (**Factory-Mounted**).

HOT GAS BY-PASS – Permits continuous, stable operation at capacities below the minimum step of compressor unloading to as low as 5% capacity (depending on both the unit and operating conditions) by introducing an artificial load on the cooler. Hot gas by-pass is installed on only refrigerant system #1 on two-circuited units (**Factory-Mounted**).

DX COOLER 300 PSIG (21 bar) DWP WATERSIDE – The waterside will be of 300 PSIG (21 bar) instead of the standard 150 PSIG DWP. 300 PSIG R.F. flanges are included on the DX cooler nozzles (**Factory-Mounted**). The companion flanges will be field-supplied by others.

FLANGES (VICTAULIC TYPE) – Consists of two (2) Flange adapters for grooved end pipe (standard 150 psi [10.5 bar] cooler).

FLOW SWITCH – The flow switch or its equivalent must be furnished with each unit.

150 PSIG (10.5 bar) DWP – For standard units. Johnson Controls model F61MG-1C Vapor-proof SPDT, NEMA 4X switch (150 PSIG [10.5 bar] DWP), -20°F to 250°F (-29°C to 121°C), with 1" NPT connection for upright mounting in horizontal pipe (**Field-Mounted**).

300 psig (21 bar) DWP – For units with optional 300 PSIG (21 bar) DX cooler. McDonnell & Miller model FS74W Vapor-proof SPDT, NEMA 4X switch (300 PSIG (21 bar) DWP), -20°F to 300°F (-29°C to 149°C), with 1¼ inch MPT connection for upright mounting in horizontal pipe (**Field-Mounted**).

DIFFERENTIAL PRESSURE SWITCH – Alternative to an above mentioned flow switch. Pretempco model DPS300AP40PF-82582-5 (300 psi max. working pressure), SPDT 5 amp 125/250VAC switch, Range 0 - 40 PSID, deadband 0.5 - 0.8 psi, with 1/4" NPTE Pressure Connections.

REMOTE DX COOLER – A split system arrangement with the cooler, leaving & return water sensors, liquid line solenoid valves, filter driers, sightglasses & TXVs shipped loose for field connection to the air-cooled condensing section. The DX cooler and outdoor section will have a nitrogen holding charge. Interconnecting rigid piping, wiring and refrigerant are by others. Includes YORK Service startup. *See Form 150.62-NM1.1 (200) for other application information* (this option includes the Crankcase Heater option) (**Field-Mounted**).

CONDENSER AND CABINET OPTIONS

Condenser coil protection against corrosive environments is available by choosing any of the following options. *For additional application recommendations, refer to FORM 150.12-ES1* (**Factory-Mounted**).

PRE-COATED FIN CONDENSER COILS – The unit's coils are constructed with black epoxy coated aluminum fins. This can provide corrosion resistance comparable to copper-fin coils in typical seashore locations. Either these or the post-coated coils (below) are recommended for units being installed at the seashore or where salt spray may hit the unit.

POST-COATED DIPPED CONDENSER COILS – The unit's coils are constructed with dipped-cured condenser coils. This is another choice for seashore and other corrosive applications (with the exception of strong alkalis, oxidizers and wet bromine, chlorine and fluorine in concentrations greater than 100 ppm).

COPPER FIN CONDENSER COILS – The unit's coils are constructed with copper fins. (This is not recommended for units in areas where they may be exposed to acid rain).

ENCLOSURE PANELS (UNIT) – Tamperproof Enclosure Panels prevent unauthorized access to units. Enclosure Panels can provide an aesthetically pleasing alternative to expensive fencing. Additionally, for proper head pressure control, YORK recommends the use of :

LOUVERED PANELS (Full Unit) – Louvered panels surround the front, back, and sides of the unit. They prevent unauthorized access and visually screen unit components. Unrestricted air flow is permitted through generously sized louvered openings. This option is applicable for any outdoor design ambient temperature up to 115°F (46°C) (**Factory-Mounted**).

SOUND REDUCTION OPTIONS

SOUND ATTENUATION – One or both of the following sound attenuation options are recommended for residential or other similar sound-sensitive locations. Louvered Panels can be ordered for winter applications where wind gusts may exceed five miles per hour. The following types of enclosure options are available:

COMPRESSOR ACOUSTIC SOUND BLANKET – Each compressor is individually enclosed by an acoustic sound blanket. The sound blankets are made with one layer of acoustical absorbent textile fiber of 5/8" (15mm) thickness; one layer of anti-vibrating heavy material thickness of 1/8" (3mm). Both are closed by two sheets of welded PVC, reinforced for temperature and UV resistance (**Factory-Mounted**).

ULTRA QUIET FANS – Lower RPM, 8-pole fan motors are used with steeper-pitch fans (**Factory-Mounted**).

VIBRATION ISOLATORS – Level adjusting, spring type 1" (25.4mm) or seismic deflection or neoprene pad isolators for mounting under unit base rails (**Field-Mounted**).

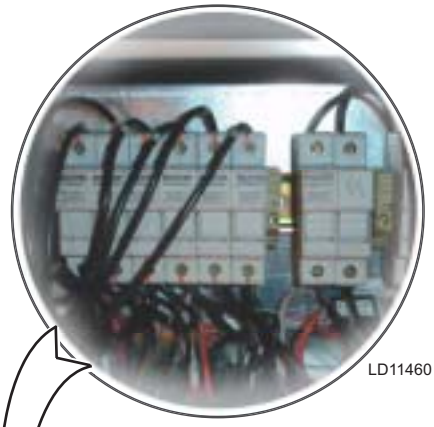
UNIT COMPONENTS

CONTROL / POWER PANEL COMPONENTS

TERMINAL BLOCK

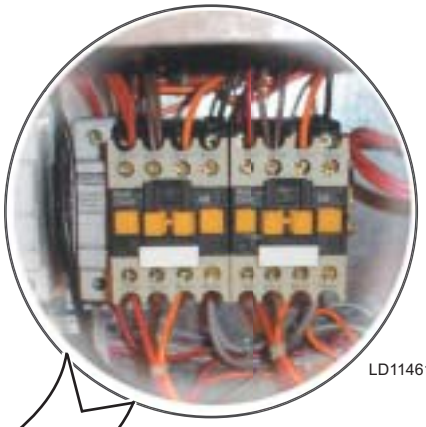
LD11459

FAN FUSES

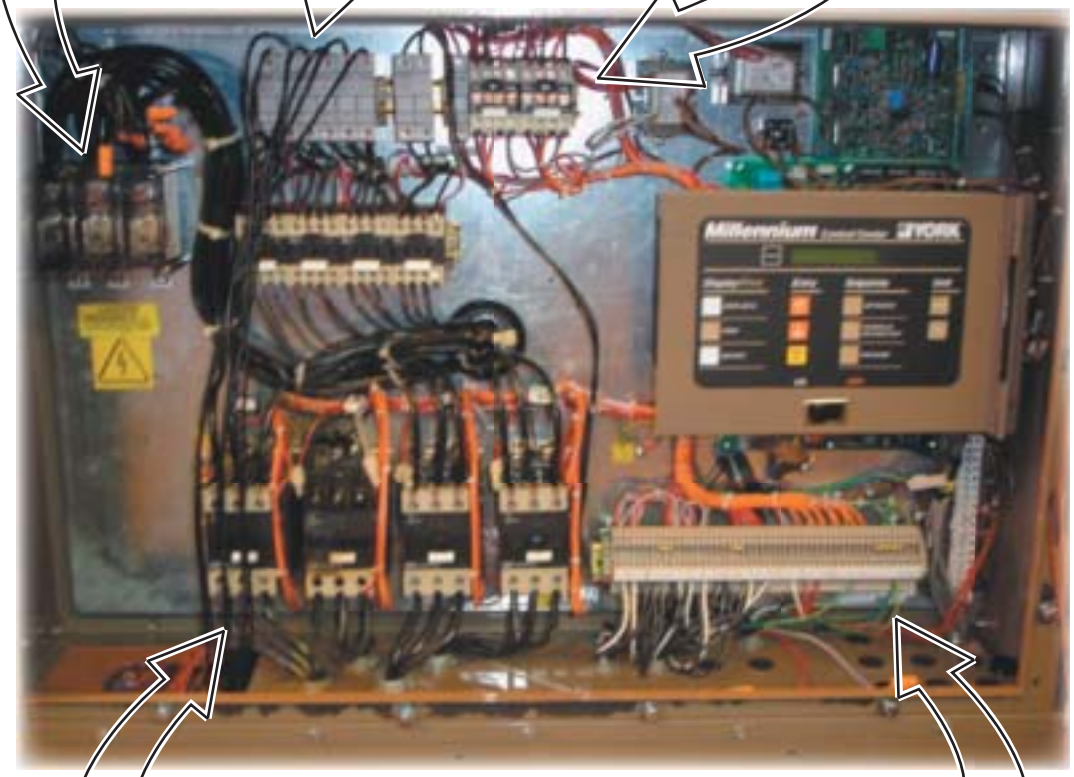


LD11460

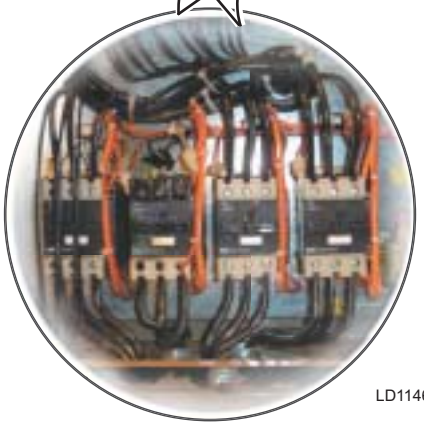
CR1 / CR2



LD11461

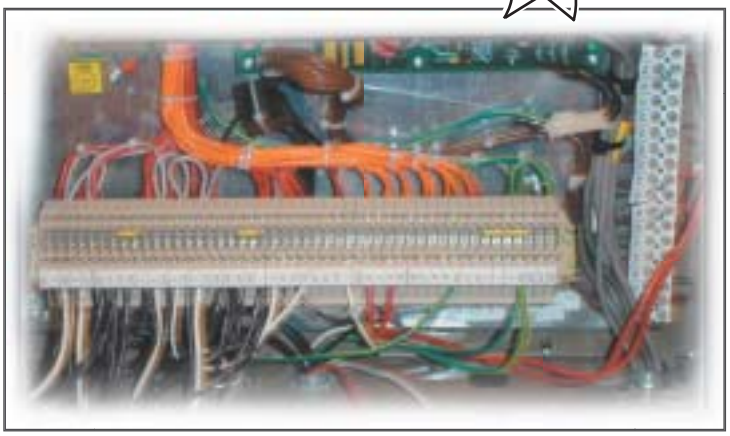


LD11458



LD11462

COMPRESSOR CONTACTS



LD11463

TB1 / CTB1

PRODUCT IDENTIFICATION NUMBER (PIN)

BASIC UNIT NOMENCLATURE

YCAL0041EC 46**XBA**

1 2 3 4 BASE PRODUCT TYPE
- Y
- C A
- U
- L : Scroll
- : YORK
- : Chiller
- : Air-Cooled
- : Condensing Unit

5 6 7 8 NOMINAL CAPACITY
- 0 # # #
- 1 # # #

Even Number: 60 HZ Nominal Tons
Odd Number: 50 HZ Nominal kW

9 UNIT DESIGNATOR
- E : High Efficiency

10 REFRIGERANT
- C : R-22

11 12 17 VOLTAGE/STARTER
- 1 7 : 200 / 3/ 60
- 2 8 : 230 / 3 / 60
- 4 0 : 380 / 3 / 60
- 4 6 : 460 / 3 / 60
- 5 8 : 575 / 3 / 60
- X : Across the Line

14 15 DESIGN/DEVELOPMENT LEVEL
- B
- A : Design Series A : Engineering Change or PIN Level

FEATURE	DESCRIPTION	OPTION	DESCRIPTION
MODEL	**Model (PIN 1-4)**	YCAL	YCAL
CAP	**Capacity (PIN 5-8)**	0012	0012
		0018	0018
		0021	0021
		0025	0025
		0027	0027
		0032	0032
		0041	0041
		0045	0045
		0051	0051
		0055	0055
		0061	0061
		0065	0065
		0071	0071
UNIT	**Unit Designator (PIN 9)**	E	High Efficiency
REF	**Refrigerant (PIN 10)**	C	R-22
VOLTS	**Voltage (PIN 11 & 12)**	17	200/3/60
		28	230/3/60
		40	380/3/60
		46	460/3/60
		58	575/3/60
STARTER	**Starter (PIN 13)**	X	Across The Line Starter
DESIGN	**Design Series (PIN 14)**	D	Design Series D

PRODUCT IDENTIFICATION NUMBER (PIN) (CON'T)

FEATURE	DESCRIPTION	OPTION	DESCRIPTION
DEV	**Developement Level (PIN 15)**	A	Development Level A
POWER	**Power Field (PIN 16 & 17)**	SX	Single Point Terminal Block
		SD	Single Point Non-Fused Disconnect
		BX	Single Point Circuit Breaker
		QQ	Special Power Option Required
TRANS	**Cntrl Transformer (PIN 18)**	X	No Control Transformer Required
		T	Control Transformer Required
		Q	Special Control Transformer Required
PFC	**Power Factor Capacitor (PIN 19)**	X	No Power Capacitor Required
		C	Power Capacitor Required
		Q	Special Power Capacitor Required
AMB	**Ambient Kits (PIN 20)**	X	No Ambient Kits Required
		L	Low Ambient Kits Required
		H	High Ambient Kits Required
		A	High/Low Ambient Kits Required
		Q	Special Ambient Kits Required
BAS	**BAS Reset/Offset (PIN 21)**	X	No BAS Reset/Offset Required
		M	ISN Microgateway Required
		T	BAS Reset/Offset Required
		Q	Special BAS Reset/Offset Required
LCD	**Language (PIN 22)**	X	English
		S	Spanish
		F	French
		G	German
		Q	Special Language Required
RDOUT	**Readout Kits (PIN 23)**	X	No Readout Kit Required
		R	Discharge Readout Kit Required
		Q	Special Pressure Readout Required
SAFETY	**Safety Codes (PIN 24)**	L	N American Safety Code(Cul/Cet)
SENSOR	**(PIN 25)**	X	No Option Required
		Q	Special Quote
PUMP	**(PIN 26)**	X	No Motor Current
		C	Motor Current Readout
		Q	Special Quote
REMOTE	**Remote Panel (PIN 27)**	X	No Remote Panel Required
		O	OptiView Remote Panel Required
		Q	Special Remote Panel Required
SEQ	**Sequence Kit (PIN 28)**	X	No Sequence Kit Required
		S	Sequence Kit Required= {SEQ/S}
		Q	Special Sequence Required

PRODUCT IDENTIFICATION NUMBER (PIN) (CON'T)

FEATURE	DESCRIPTION	OPTION	DESCRIPTION
TEMP	**Leaving Water Temp (PIN 29, 30)**	NUM	Leaving Water Temp= {TEMP/NUM} Degrees
		QQ	Special LWT Requirements
CHICAGO	**Chicago Code Kit (PIN 31)**	X	No Chicago Code Kit Required
		C	Chicago Code Kit Required
		S	Service Isolation Valves
		B	Both Chicago Code & Serv Isolation
		Q	Special Chicago Code Kit Required
VALVES	**Valves (PIN 32)**	X	Standard Valves Required
		Q	Special Optional Valves Required
HGBP	**Hot Gas Bypass (PIN 33)**	X	No Hot Gas Bypass Required
		1	Hot Gas Bypass Required-1 Circuit
		2	Hot Gas Bypass Required-2 Circuit
		Q	Special Hot Gas Required
GAUGE	**(PIN 34)**	X	No Option Required
		Q	Special Quote
OVERLOAD	**(PIN 35)**	X	No Option Required
		Q	Special Quote
PIN 36	**(PIN 36)**	X	No Option Required
		Q	Special Quote
HTR	**Crankcase Heater (PIN 37)**	X	Crankcase Heater Standard
		Q	Special Crankcase Heater Required
DWP	**DWP (PIN 38)**	X	150 psig DWP Waterside
		3	300 psig DWP Waterside
		Q	Special DWP
INS	**Insulation (PIN 39)**	X	Standard Insulation
		D	Double Thick Insulation
		Q	Special Insulation Required
FLANGES	**Flanges (PIN 40)**	X	Standard Victaulic
		V	Victaulic to Flange Adapter
		Q	Special Flanges Required
FLOW	**Flow Switch (PIN 41)**	X	No Flow Switch Required
		S	One Flow Switch Required
		T	Two Flow Switches Required
		U	Three Flow Switches Required
		D	One Differential Pressure Switch Required
		E	Two Differential Pressure Switches Required
		F	Three Differential Pressure Switches Required
		Q	Special Flow Switch Required

PRODUCT IDENTIFICATION NUMBER (PIN) (CON'T)

FEATURE	DESCRIPTION	OPTION	DESCRIPTION
VESSEL	**Vessel Codes (PIN 42)**	X	UL Pressure Code Vessel
		A	ASME Pressure Vessel Code
		Q	Special Pressure Vessel Code
CLR	**Cooler (PIN 43)**	X	Standard Cooler Required
		R	Remote Cooler Required
		Q	Special Cooler Required
PIN 44	**(PIN 44)**	X	No Option Required
		Q	Special Quote
COILS	**Coils (PIN 45)**	X	Aluminum Coil
		B	Pre-Coated Fin Coil
		C	Copper Coil
		P	Post-Coated Dipped Coil
		Q	Special Coil
PIN 46	**(PIN 46)**	X	No Option Required
		Q	Special Quote
FANMOTORS	**Fan Motors (PIN 47)**	X	TEAO Fan Motors
		Q	Special Fan Motors Required
ENCL	**Enclosure Panel (PIN 48)**	1	Wire Enclosures-Factory
		7	Louvered Enclosure-Factory
		8	Louvered Enclosures-Field
		Q	Special Encolsures Panels
ACOUSTIC	**Acoustic Blanket (PIN 49)**	X	No Acoustic Blanket Required
		B	Acoustic Blanket Required
		Q	Special Acoustic Blanket Required
PIN 50	**(PIN 50)**	X	No Option Required
		Q	Special Quote
PIN 51	**(PIN 51)**	X	No Option Required
		Q	Special Quote
FANS	**Sound Fans (PIN 52)**	X	Standard Low Sound Fans Required
		L	Ultra Low Sound Fans Required
		Q	Special Sound Fans Required
PAINT	**(PIN 53)**	X	No Option Required
		Q	Special Quote
ISOL	**Vibration Isolators (PIN 54)**	X	No Isolators Required
		1	1" Deflection Isolators Required
		N	Neoprene Isolators Required
		S	Seismic Isolators Required
		Q	Special Isolators Required

PRODUCT IDENTIFICATION NUMBER (PIN) (CON'T)

FEATURE	DESCRIPTION	OPTION	DESCRIPTION
WARRANTY	**Warranty (PIN 55)**	X	1st Year Parts Only
		B	1st Year Parts & Labor
		C	2nd Year Parts Only
		D	2nd Parts & Labor
		E	5 Year Compressor Parts Only
		F	5 Year Compressor Parts & Labor
		G	5 Year Unit Parts Only
		H	5 Year Unit Parts & labor
REFWTY	**Refrigerant Warranty (PIN 56)**	X	No Refrigerant Warranty Required
		1	1 Year Refrigerant
		2	2 Year Refrigerant
		5	5 Year Refrigerant
SHIP	**Ship Instructions (PIN 57)**	X	No Option Required
		A	Buy American Act Compliance
		B	Both Buy American Act Compliance and Container Shipping Kit
		C	Container Shipping
		Q	Special Quote
PIN 58	**(PIN 58)**	X	No Option Required
		Q	Special Quote
PIN 59	**(PIN 59)**	X	No Option Required
		Q	Special Quote
PIN 60	**(PIN 60)**	X	No Option Required
		Q	Special Quote
MFG	**Plant of Mfg. (PIN 61)**	R	Plant of Manufacture-Monterrey
LOC	**Mfg. Location**	MEX	Mexico
		SAT	San Antonio
YW	**YorkWorks Version**	CV	YorkWorks ConVersion
		UV	YorkWorks Version
SQ	**Special Quote**	Q	Special Quote

REFRIGERANT FLOW DIAGRAM

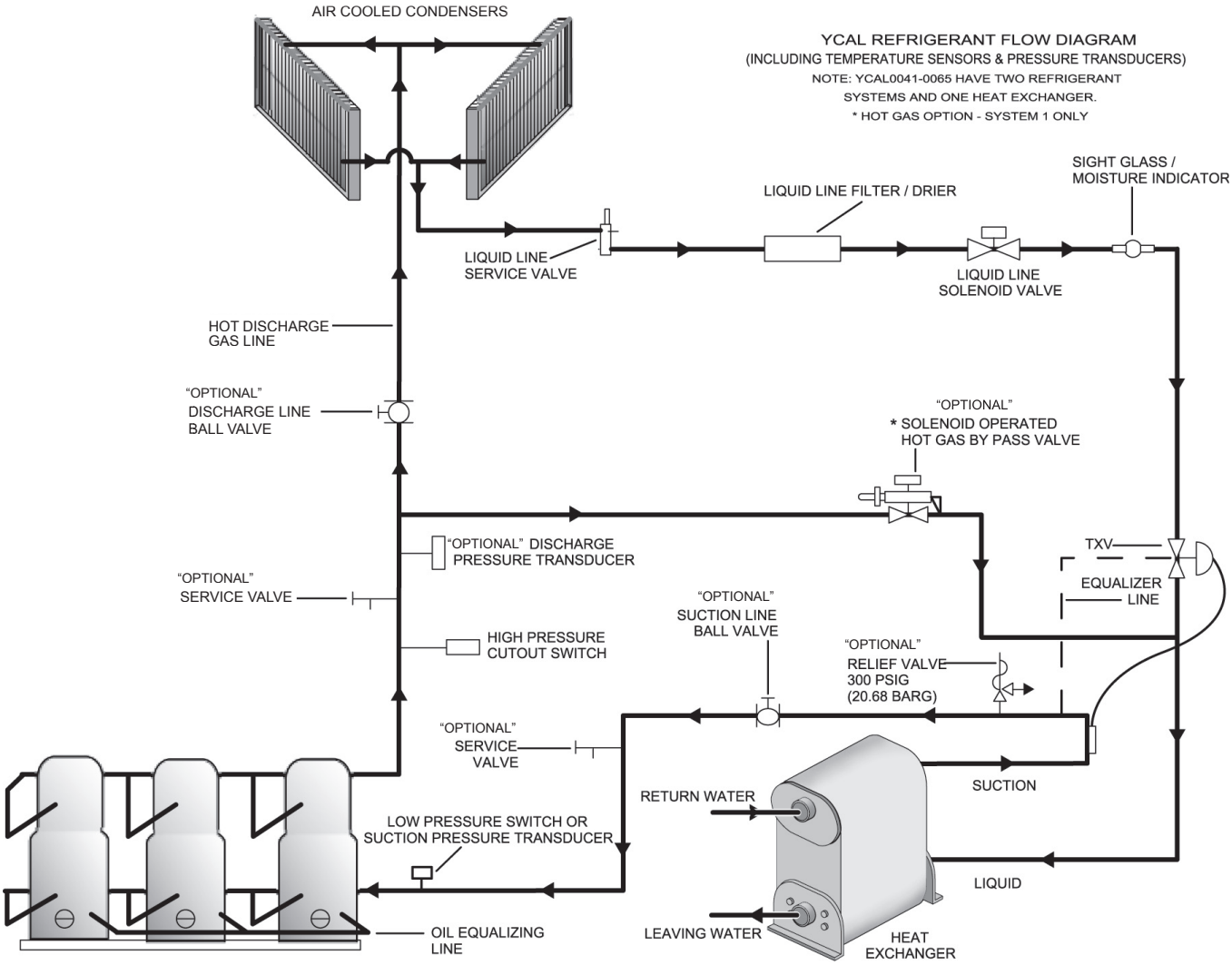

AIR COOLED CONDENSERS
YCAL REFRIGERANT FLOW DIAGRAM
(INCLUDING TEMPERATURE SENSORS & PRESSURE TRANSDUCERS)
NOTE: YCAL0041-0065 HAVE TWO REFRIGERANT
SYSTEMS AND ONE HEAT EXCHANGER.
* HOT GAS OPTION - SYSTEM 1 ONLY
SIGHT GLASS / MOISTURE INDICATOR
LIQUID LINE FILTER / DRIER
LIQUID LINE SERVICE VALVE
LIQUID LINE SOLENOID VALVE
HOT DISCHARGE GAS LINE
"OPTIONAL" DISCHARGE LINE BALL VALVE
"OPTIONAL" * SOLENOID OPERATED HOT GAS BY PASS VALVE
"OPTIONAL" DISCHARGE PRESSURE TRANSDUCER
TXV
EQUALIZER LINE
"OPTIONAL" SERVICE VALVE
"OPTIONAL" SUCTION LINE BALL VALVE
HIGH PRESSURE CUTOUT SWITCH
"OPTIONAL" RELIEF VALVE 300 PSIG (20.68 BARG)
"OPTIONAL" SERVICE VALVE
SUCTION
RETURN WATER
LOW PRESSURE SWITCH OR SUCTION PRESSURE TRANSDUCER
LIQUID
OIL EQUALIZING LINE
LEAVING WATER
HEAT EXCHANGER
LD11417

FIG. 1 – REFRIGERANT FLOW DIAGRAM

SECTION 3 - HANDLING AND STORAGE

DELIVERY AND STORAGE

To ensure consistent quality and maximum reliability, all units are tested and inspected before leaving the factory. Units are shipped completely assembled and containing refrigerant under pressure. Units are shipped without export crating unless crating has been specified on the Sales Order.

If the unit is to be put into storage, prior to installation, the following precautions should be observed:

- The chiller must be "blocked" so that the base is not permitted to sag or bow.
- Ensure that all openings, such as water connections, are securely capped.
- Do not store where exposed to ambient air temperatures exceeding 110°F (43°C).
- The condensers should be covered to protect the fins from potential damage and corrosion, particularly where building work is in progress.
- The unit should be stored in a location where there is minimal activity in order to limit the risk of accidental physical damage.
- To prevent inadvertent operation of the pressure relief devices the unit must not be steam cleaned.
- It is recommended that the unit is periodically inspected during storage.

INSPECTION

Remove any transit packing and inspect the unit to ensure that all components have been delivered and that no damage has occurred during transit. If any damage is evident, it should be noted on the carrier's freight bill and a claim entered in accordance with the instructions given on the advice note.

Major damage must be reported immediately to your local YORK representative.

MOVING THE CHILLER

Prior to moving the unit, ensure that the installation site is suitable for installing the unit and is easily capable of supporting the weight of the unit and all associated services.

The units are designed to be lifted using cables. A spreader bar or frame should be used in order to prevent damage to the unit from the lifting chains.

Units are provided with lifting eyes in the sides of the base frame, which can be attached to directly using shackles or safety hooks.

The unit must only be lifted by the base frame at the points provided. Never move the unit on rollers, or lift the unit using a forklift truck.

Care should be taken to avoid damaging the condenser cooling fins when moving the unit.

Lifting Weights

For details of weights and weight distribution, refer to the data shipped in the chiller information packet and unit nameplate.

UNIT RIGGING

Use spreader bars to avoid lifting chains hitting the chiller.

CAUTION

Never lift the chiller using a forklift or by hooking to the top rails. Use only the lifting holes provided.

Lifting Instructions are placed on a label on the chiller and on the shipping bag.

LD10951

SECTION 4 - INSTALLATION

WARNING

To ensure warranty coverage, this equipment must be commissioned and serviced by an authorized YORK service mechanic or a qualified service person experienced in chiller installation. Installation must comply with all applicable codes, particularly in regard to electrical wiring and other safety elements such as relief valves, HP cutout settings, design working pressures, and ventilation requirements consistent with the amount and type of refrigerant charge.

Lethal voltages exist within the control panels. Before servicing, open and tag all disconnect switches.

INSTALLATION CHECKLIST

The following items, 1 through 5, must be checked before placing the units in operation.

1. Inspect the unit for shipping damage.
2. Rig unit using spreader bars.
3. Open the unit only to install water piping system. Do not remove protective covers from water connections until piping is ready for attachment. Check water piping to ensure cleanliness.
4. Pipe unit using good piping practice *(see ASHRAE handbook section 215 and 195).*
5. Check to see that the unit is installed and operated within limitations *(Refer to LIMITATIONS).*

The following pages outline detailed procedures to be followed to install and start-up the chiller.

HANDLING

These units are shipped as completely assembled units containing full operating charge, and care should be taken to avoid damage due to rough handling.

WARNING

The unit should be lifted by inserting hooks through the holes provided in unit base rails. Spreader bars should be used to avoid crushing the unit frame rails with the lifting chains (See below).

LD10951

INSPECTION

Immediately upon receiving the unit, it should be inspected for possible damage which may have occurred during transit. If damage is evident, it should be noted in the carrier's freight bill. A written request for inspection by the carrier's agent should be made at once. *See "Instruction" manual, Form 50.15-NM for more information and details.*

LOCATION AND CLEARANCES

These units are designed for outdoor installations on ground level, rooftop, or beside a building. Location should be selected for minimum sun exposure and to insure adequate supply of fresh air for the condenser. The units must be installed with sufficient clearances for air entrance to the condenser coil, for air discharge away from the condenser, and for servicing access.

In installations where winter operation is intended and snow accumulations are expected, additional height must be provided to ensure normal condenser air flow.

Clearances are listed under "Notes" in the "DIMENSIONS" section.

Foundation

The unit should be mounted on a flat and level foundation, floor, or rooftop capable of supporting the entire operating weight of the equipment. *See PHYSICAL DATA for operating weight.* If the unit is elevated beyond the normal reach of service personnel, a suitable catwalk must be capable of supporting service personnel, their equipment, and the compressors.

Ground Level Locations

It is important that the units be installed on a substantial base that will not settle. A one piece concrete slab with footers extended below the frost line is highly recommended. Additionally, the slab should not be tied to the main building foundations as noise and vibration may be transmitted. Mounting holes are provided in the steel channel for bolting the unit to its foundation *(see DIMENSIONS).*

For ground level installations, precautions should be taken to protect the unit from tampering by or injury to unauthorized persons. Screws and/or latches on access panels will prevent casual tampering. However, further safety precautions such as a fenced-in enclosure or locking devices on the panels may be advisable.

Rooftop Locations

Choose a spot with adequate structural strength to safely support the entire weight of the unit and service personnel. Care must be taken not to damage the roof.

Consult the building contractor or architect if the roof is bonded. Roof installations should have wooden beams (treated to reduce deterioration), cork, rubber, or vibration isolators under the base to minimize vibration.

Noise Sensitive Locations

Efforts should be made to assure that the chiller is not located next to occupied spaces or noise sensitive areas where chiller noise level would be a problem. Chiller noise is a result of compressor and fan operation. Considerations should be made utilizing noise levels published in the YORK Engineering Guide for the specific chiller model. Sound blankets for the compressors and low sound fans are available.

SPRING ISOLATORS (OPTIONAL)

When ordered, four (4) isolators will be furnished.

Identify the isolator, locate at the proper mounting point, and adjust per instructions.

COMPRESSOR MOUNTING

The compressors are mounted on four (4) rubber isolators. The mounting bolts should not be loosened or adjusted at installation of the chiller.

REMOTE COOLER OPTION

For units using remote cooler option, *refer to instructions included with miscellaneous cooler parts kit.*

The unit and remote cooler are shipped with a 6 lb. (2.7 kg) nitrogen holding charge. The nitrogen charge must be removed, and system evacuated, and the refrigerant charge must be weighed-in according to the operating charge listed under PHYSICAL DATA. Additional charge must also be added for the refrigerant lines.

CHILLED LIQUID PIPING

General – When the unit(s) has been located in its final position, the unit water piping may be connected. Normal installation precautions should be observed in order to receive maximum operating efficiencies. Piping should be kept free of all foreign matter. All chilled water evaporator piping must comply in all respects with local plumbing codes and ordinances.

Since elbows, tees and valves decrease pump capacity, all piping should be kept as straight and as simple as possible. **All piping must be supported independent of the chiller.**

Consideration should be given to compressor access when laying out water piping. Routing the water piping too close to the unit could make compressor servicing/replacement difficult.

Hand stop valves should be installed in all lines to facilitate servicing.

Piping to the inlet and outlet connections of the chiller should include high-pressure rubber hose or piping loops to ensure against transmission of water pump vibration. The necessary components must be obtained in the field.

Drain connections should be provided at all low points to permit complete drainage of the cooler and system water piping.

A small valve or valves should be installed at the highest point or points in the chilled water piping to allow any trapped air to be purged. Vent and drain connections should be extended beyond the insulation to make them accessible.

The piping to and from the cooler must be designed to suit the individual installation. It is important that the following considerations be observed:

1. The chilled liquid piping system should be laid out so that the circulating pump discharges directly into the cooler. The suction for this pump should be taken from the piping system return line and not the cooler. This piping scheme is recommended, but is not mandatory.

2. The inlet and outlet cooler connection sizes are 3" (YCAL0041 - 0071).

3. A strainer, preferably 40 mesh, **must** be installed in the cooler inlet line just ahead of the cooler. This is important to protect the cooler from entrance of large particles which could cause damage to the evaporator.

4. All chilled liquid piping should be thoroughly flushed to free it from foreign material before the system is placed into operation. Use care not to flush any foreign material into or through the cooler.

5. As an aid to servicing, thermometers and pressure gauges should be installed in the inlet and outlet water lines.

6. The chilled water lines that are exposed to outdoor ambients should be wrapped with supplemental heater cable and insulated to protect against freeze-up during low ambient periods, and to prevent formation of condensation on lines in warm humid locations.

7. A chilled water flow switch, (either by YORK or others) MUST be installed in the leaving water piping of the cooler. There should be a straight horizontal run of at least 5 diameters on each side of the switch. Adjust the flow switch paddle to the size of the pipe in which it is to be installed *(see manufacturer's instructions furnished with the switch)*. The switch is to be wired to terminals 13 - 14 of CTB1 located in the control panel, as shown on the unit wiring diagram.

The Flow Switch MUST NOT be used to start and stop the chiller (i.e. starting and stopping the chilled water pump). It is intended only as a safety switch.

DUCT WORK CONNECTION

General Requirements

The following duct work recommendations are intended to ensure satisfactory operation of the unit. Failure to follow these recommendations could cause damage to the unit, or loss of performance, and may invalidate the warranty.

When ducting is to be fitted to the fan discharge it is recommended that the duct should be the same cross-sectional area as the fan outlet and straight for at least three feet (1 meter) to obtain static regain from the fan. Duct work should be suspended with flexible hangers to prevent noise and vibration being transmitted to the structure. A flexible joint is also recommended between the duct attached to the fan and the next section for the same reason. Flexible connectors should not be allowed to concertina.

The unit(s) is not designed to take structural loading. No significant amount of weight should be allowed to rest on the fan outlet flange, deck assemblies or condenser coil module. No more than 3 feet (1 meter) of light construction duct work should be supported by the unit. Where cross winds may occur, any duct work must be supported to prevent side loading on the unit.

If the ducts from two or more fans are to be combined into a common duct, back-flow dampers should be fitted in the individual fan ducts. This will prevent re-circulation of air when only one of the fans is running.

Units are supplied with outlet guards for safety and to prevent damage to the fan blades. If these guards are removed to fit duct work, adequate alternative precautions must be taken to ensure persons cannot be harmed or put at risk from rotating fan blades.

WIRING

Liquid Chillers are shipped with all factory-mounted controls wired for operation.

Field Wiring – Power wiring must be provided through a fused disconnect switch to the unit terminals (or optional molded disconnect switch) in accordance with N.E.C. or local code requirements. Minimum circuit ampacity and maximum dual element fuse size are given in Table 10.

A 120-1-60, 15 amp source must be supplied for the control panel through a fused disconnect when a control panel transformer (optional) is not provided *(Refer to Fig. 2).*

See unit wiring diagrams for field and power wiring connections, chilled water pump starter contacts, alarm contacts, compressor run status contacts, PWM input, and load limit input. Refer to section on UNIT OPERATION for a detailed description of operation concerning aforementioned contacts and inputs.

Evaporator Pump Start Contacts

Terminal block TB1 – terminals 23 to 24, are normally-open contacts that can be used to switch field supplied power to provide a start signal to the evaporator pump contactor. The contacts will be closed when any of the following conditions occur:

1. Low Leaving Chilled Liquid Fault
2. Any compressor is running
3. Daily schedule is not programmed OFF and the Unit Switch is ON

The pump will not run if the micro panel has been powered up for less than 30 seconds, or if the pump has run in the last 30 seconds, to prevent pump motor overheating. *Refer to Fig. 3 and unit wiring diagram*.

System Run Contacts

Contacts are available to monitor system status. Normally-open auxiliary contacts from each compressor contactor are wired in parallel with TB1 – terminals 25 to 26 for system 1, and TB1 – terminals 27 to 28 for system 2 (YCAL0041 - YCAL0071). *Refer to Fig. 3 and unit wiring diagram.*

Alarm Status Contacts

Normally-open contacts are available for each refrigerant system. These normally-open contacts close when the system is functioning normally. The respective contacts will open when the unit is shut down on a unit fault, or locked out on a system fault. Field connections are at TB1 terminals 29 to 30 (system 1), and terminals 31 to 32 (system 2 YCAL0041 - YCAL0071). Refer to Fig. 3 and unit wiring diagram.

Remote Start/Stop Contacts

To remotely start and stop the chiller, dry contacts can be wired in series with the flow switch and CTB1 - terminals 13 to 14. *Refer to Fig. 3 and unit wiring diagram.*

Remote Emergency Cutoff

Immediate shutdown of the chiller can be accomplished by opening a field-installed dry contact to break the electrical circuit between terminals 5 to L on terminal block TB1. The unit is shipped with a factory jumper installed between terminals 5 to L, which must be removed if emergency shutdown contacts are installed. *Refer to Fig. 3 and unit wiring diagram.*

PWM Input

The PWM input allows reset of the chilled liquid setpoint by supplying a "timed" contact closure. Field wiring should be connected to CTB1 – terminals 13 to 20. A detailed explanation is provided in the Unit Control section. *Refer to Page 37 & and unit wiring diagram.*

Load Limit Input

Load limiting is a feature that prevents the unit from loading beyond a desired value. The unit can be "load limited" either 33%, 40%, 50%, 66% or 80%, depending on the number of compressors on unit. The field connections are wired to CTB1 – terminals 13 to 21, and work in conjunction with the PWM inputs. A detailed explanation is provided in the Unit Control section. *Refer to Page 37 and unit wiring diagram.*

When using the Load Limit feature, the PWM feature will not function – SIMULTANEOUS OPERATION OF LOAD LIMITING AND TEMPERATURE RESET (PWM INPUT) CANNOT BE DONE.

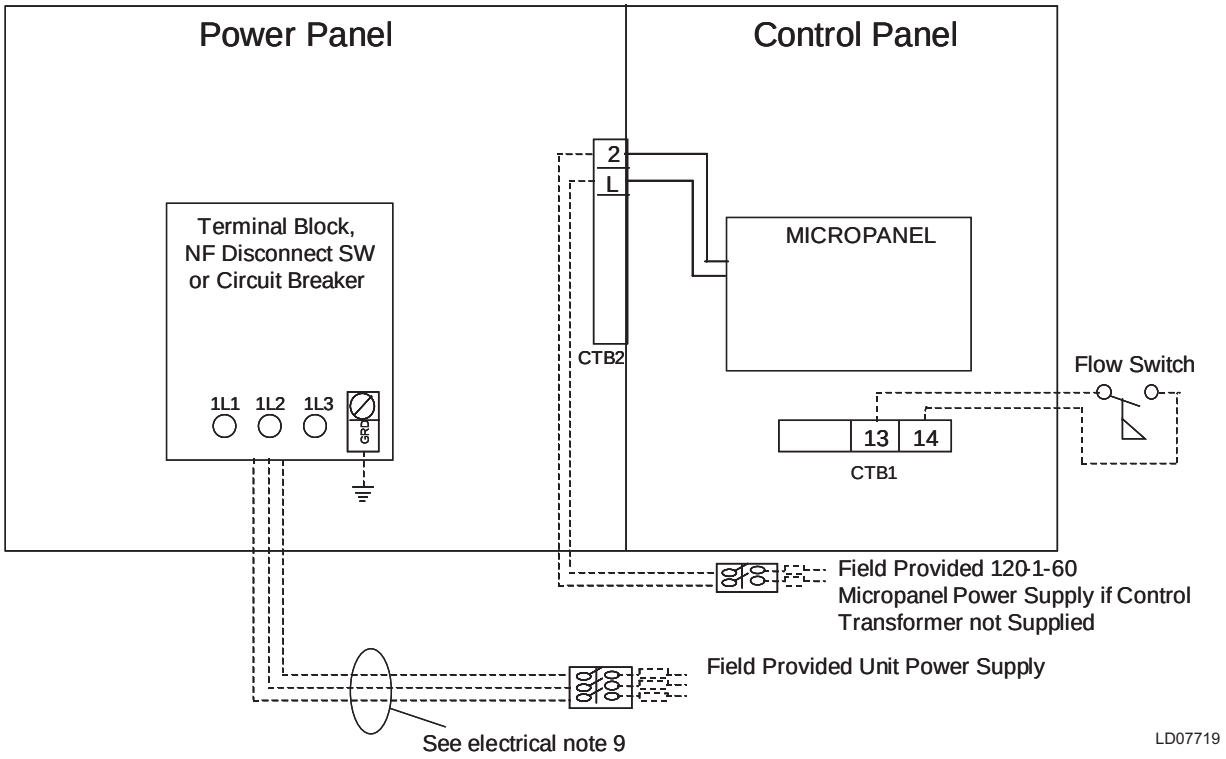
Flow Switch Input

The flow switch is field wired to CTB1 terminals 13 - 14. *See Page 37 and unit wiring diagram.*

COMPRESSOR HEATERS

Compressor heaters are standard. SM90 - SM160 compressors utilize 50W heaters; SM185 compressors utilize 75W heaters. If power is OFF more than two hours, the crankcase heaters must be energized for 18 - 24 hours prior to restarting a compressor. This will assure that liquid slugging and oil dilution does not damage the compressors on start.

SINGLE-POINT SUPPLY CONNECTION – TERMINAL BLOCK, NON-FUSED DISCONNECT SWITCH OR CIRCUIT BREAKER (0041 - 0071)



* Models YCAL0040-0071 Only (Models YCAL0014-0034 are Single Point)

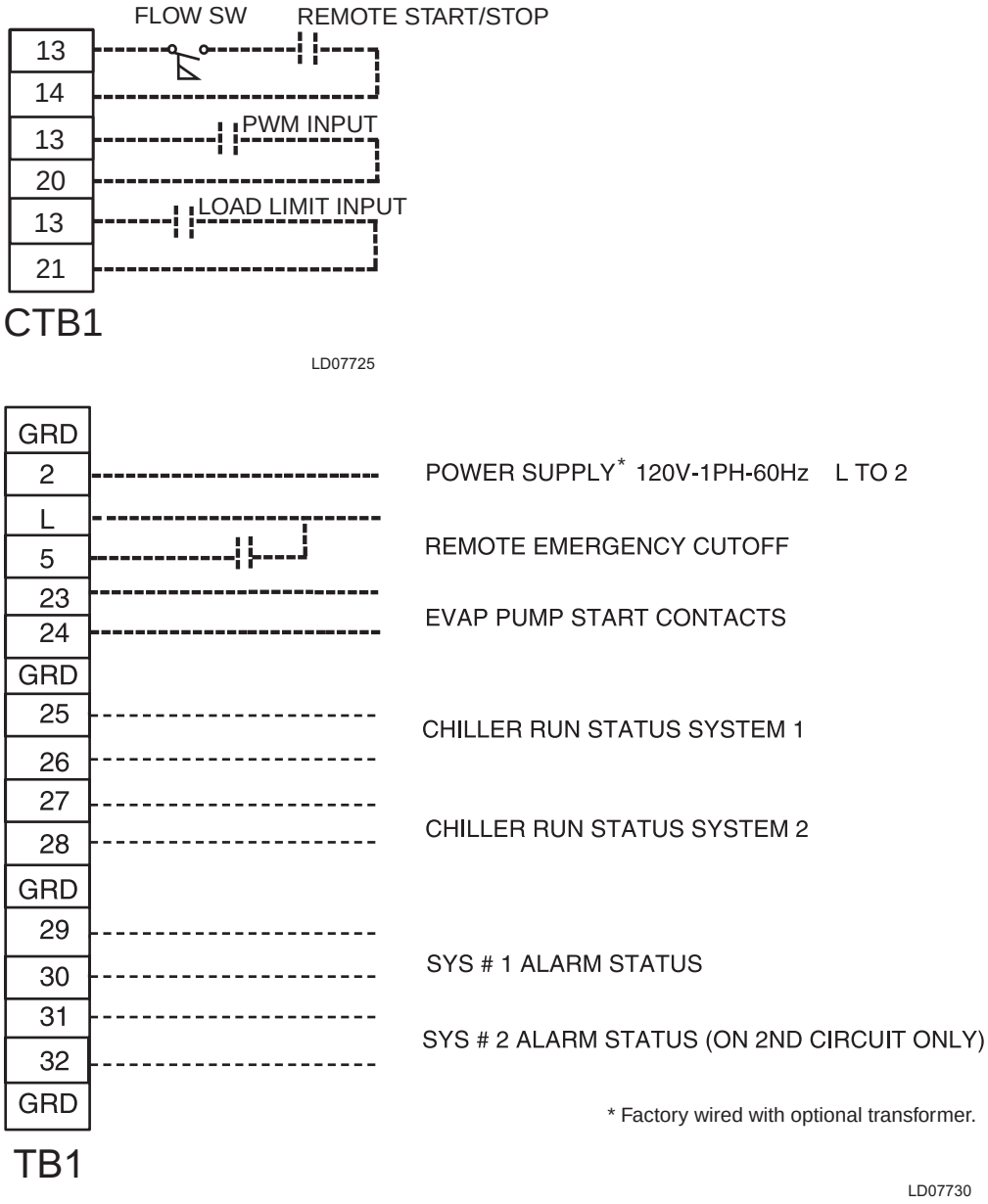
Electrical Notes and Legend located on page 55.

It is possible that multiple sources of power can be supplying the unit power panel. To prevent serious injury or death, the technician should verify that NO LETHAL VOLTAGES are present inside the panel AFTER disconnecting power, PRIOR to working on equipment.

The unit evaporator heater uses 120VAC. Disconnecting 120VAC power from the unit, at or below freezing temperatures, can result in damage to the evaporator and unit as a result of the chilled liquid freezing.

FIG. 2 – SINGLE-POINT SUPPLY CONNECTION – TERMINAL BLOCK, NON-FUSED DISCONNECT SWITCH OR CIRCUIT BREAKER (0041 - 0071)

CONTROL WIRING



4

WARNING

It is possible that multiple sources of power can be supplying the unit power panel. To prevent serious injury or death, the technician should verify that NO LETHAL VOLTAGES are present inside the panel AFTER disconnecting power, PRIOR to working on equipment.

CAUTION

The unit evaporator heater uses 120VAC. Disconnecting 120VAC power from the unit, at or below freezing temperatures, can result in damage to the evaporator and unit as a result of the chilled liquid freezing.

FIG. 3 – CONTROL WIRING

SECTION 5 - COMMISSIONING

Commissioning of this unit should only be carried out by YORK Authorized personnel.

Commissioning personnel should be thoroughly familiar with the information contained in this literature, in addition to this section.

Perform the commissioning using the detailed checks outlined in the EQUIPMENT START-UP CHECK LIST (Page 40) as the commissioning procedure is carried out.

PREPARATION – POWER OFF

The following basic checks should be made with the customer power to the unit switched OFF.

Inspection

Inspect unit for installation damage. If found, take action and/or repair as appropriate.

Refrigerant Charge

Packaged units are normally shipped as standard with a full refrigerant operating charge. Check that refrigerant pressure is present in both systems and that no leaks are apparent. If no pressure is present, a leak test must be undertaken, the leak(s) located and repaired. Remote systems and units are supplied with a nitrogen holding charge. These systems must be evacuated with a suitable vacuum pump/recovery unit as appropriate to below 500 microns.

Do not liquid charge with static water in the cooler. Care must also be taken to liquid charge slowly to avoid excessive thermal stress at the charging point. Once the vacuum is broken, charge into the condenser coils with the full operating charge as given in the Technical Data Section.

Service and Oil Line Valves

Open each compressor suction, economizer, and discharge service valve. If valves are of the back-seat type, open them fully (counterclockwise) then close one turn of the stem to ensure operating pressure is fed to pressure transducers. Open the liquid line service valve and oil return line ball valve fully in each system.

Compressor Oil

To add oil to a circuit - connect a YORK hand oil pump (Part No. 470-10654-000) to the 1/4" oil charging valve on the oil separator piping with a length of clean hose or copper line, but do not tighten the flare nut. Using clean oil of the correct type ("F" oil), pump oil until all air has been purged from the hose then tighten the nut. Stroke the oil pump to add oil to the oil system. The oil level should be between the middle of the lower and middle of the upper sight glasses of the oil separator. Approximately 4-5 gallons is present in the each refrigerant system, with typically 1-2 gallons in each oil separator. Oil levels in the oil separators above the top sight glass in either oil separator should be avoided and may cause excessive oil carryover in the system. High oil concentration in the system may cause nuisance trips resulting from incorrect readings on the level sensor and temperature sensors. Temperature sensor errors may result in poor liquid control and resultant liquid overfeed and subsequent damage to the compressor.

Fans

Check that all fans are free to rotate and are not damaged. Ensure blades are at the same height when rotated. Ensure fan guards are securely fixed.

Isolation / Protection

Verify all sources of electrical supply to the unit are taken from a single point of isolation. Check that the maximum recommended fuse sizes given in the Technical Data Section has not been exceeded.

Control Panel

Check the panel to see that it is free of foreign materials (wire, metal chips, etc.) and clean out if required.

Power Connections

Check that the customer power cables are connected correctly to the terminal blocks or optional circuit breaker. Ensure that connections of power cables within the panels to the circuit breaker or terminal blocks are tight.

Grounding

Verify that the unit's protective ground terminal(s) are properly connected to a suitable grounding point. Ensure that all unit internal ground connections are tight.

Supply Voltage

Verify that the site voltage supply corresponds to the unit requirement and is within the limits given in the Technical Data Section.

PREPARATION – POWER ON

Perform the commissioning using the detailed checks outlined in the EQUIPMENT START-UP CHECK SHEET as the commissioning procedure is carried out.

Apply power to the chiller. Turn ON the option panel circuit breaker if supplied.

The machine is now live!

Switch Settings

Assure the chiller OFF/ON UNIT switch at the bottom of the keypad is OFF. Place the optional circuit breaker handle on the panel door to ON. The customer's disconnection devices can now be set to ON.

Verify the control panel display is illuminated. Assure the system switches under the SYSTEM SWITCHES Key are in the OFF position.

Compressor Heaters

Verify the compressor heaters are energized. If the ambient temperature is above 96°F (36°C) the compressor heaters must be on for at least 8 hours before start-up to ensure all refrigerant liquid is driven out of the compressor and the oil. If the ambient temperature is below 86°F (30°C), allow 24 hours.

Water System

Verify the chilled liquid system has been installed correctly, and has been commissioned with the correct direction of water flow through the cooler. The inlet should be at the refrigerant piping connection end of the cooler. Purge air from the top of the cooler using the plugged air vent mounted on the top of the cooler body.

Flow rates and pressure drops must be within the limits given in the Technical Data Section. Operation outside of these limits is undesirable and could cause damage.
If mains power must be switched OFF for extended maintenance or an extended shutdown period, the compressor suction, discharge and economizer service stop valves should be closed (clockwise). If there is a possibility of liquid freezing due to low ambient temperatures, the coolers should be drained or power should be applied to the chiller. This will allow the cooler heater to protect the cooler from freezing down to –20°F. Before placing the unit back in service, valves should be opened and power must be switched on (if power is removed for more than 8 hours) for at least 8 hours (24 hours if ambient temperature is below 86°F [30°C]) before the unit is restarted.

Flow Switch

Verify a chilled water flow switch is correctly fitted in the customer's piping on the cooler outlet, and wired into the control panel correctly using shielded cable.

There should be a straight run of at least 5 pipe diameters on either side of the flow switch. The flow switch should be connected to terminals 2 and 13 in the panel.

Temperature Sensor(s)

Ensure the leaving liquid temperature sensor is coated with heat conductive compound (Part No. 013-00890-000) and is inserted to the bottom of the water outlet sensor well in the cooler. This sensor also provides some freeze protection and must always be fully inserted in the water outlet sensor well.

EQUIPMENT STARTUP CHECKLIST

JOB NAME: _____
SALES ORDER #: _____
LOCATION: _____
SOLD BY: _____
INSTALLING CONTRACTOR: _____
START-UP TECHNICIAN/ COMPANY: _____
START-UP DATE : _____

CHILLER MODEL #: _____
SERIAL #: _____

CHECKING THE SYSTEM PRIOR TO INITIAL START (NO POWER)

Unit Checks

❑ 1. Inspect the unit for shipping or installation damage.

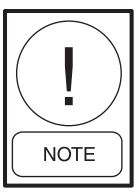
❑ 2. Assure that all piping has been completed.

❑ 3. Visually check for refrigerant piping leaks.

❑ 4. Open suction line ball valve, discharge line ball valve, and liquid line valve for each system.

❑ 5. The compressor oil level should be maintained so that an oil level is visible in the sight glass. The oil level can only be tested when the compressor is running in stabilized conditions, guaranteeing that there is no liquid refrigerant in the lower shell of the compressor. In this case, the oil should be between 1/4 and 1/2 in the sight glass. At shutdown, the oil level can fall to the bottom limit of the oil sight glass.

❑ 6. Assure water pumps are on. Check and adjust water pump flow rate and pressure drop across the cooler *(see OPERATIONAL LIMITATIONS)*. Verify flow switch operation.



Excessive flow may cause catastrophic damage to the evaporator.

❑ 7. Check the control panel to ensure it is free of foreign material (wires, metal chips, etc.).

❑ 8. Visually inspect wiring (power and control). Wiring MUST meet N.E.C. and local codes.

❑ 9. Check tightness of power wiring inside the power panel on both sides of the motor contactors and overloads.

❑10. Check for proper size fuses in main and control circuits, and verify overload setting corresponds with RLA and FLA values in electrical tables.

❑11. Assure 120VAC Control Power to TB1 has 15 amp minimum capacity.

❑ 12. Be certain all water temp sensors are inserted completely in their respective wells and are coated with heat conductive compound.

❑13. Assure that evaporator TXV bulbs are strapped onto the suction lines at 4 or 8 o'clock positions or suction temp. sensors if EEVs are installed.

COMPRESSOR HEATERS (POWER ON – 24 HOURS PRIOR TO START)

❑ 1. Apply 120VAC and verify its value between terminals 5 and 2 of CTB2. The voltage should be 120VAC +/- 10%.

Power must be applied 24 hours prior to start-up.

Each heater should draw approximately 0.5-1A.

PANEL CHECKS (POWER ON – BOTH UNIT SWITCHES OFF)

❑ 1. Apply 3-phase power and verify its value. Voltage imbalance should be no more than 2% of the average voltage.

❑ 2. Apply 120VAC and verify its value on the terminal block in the Power Panel. Make the measurement between terminals 5 and 2 of CTB2. The voltage should be 120VAC +/- 10%.

❑ 3. Program/verify the Cooling Setpoints, Program Setpoints, and unit Options. Record the values below *(see sections on Setpoints and Unit Keys for programming instruction) in TABLE 1.*

TABLE 1 – SETPOINTS ENTRY LIST

OPTIONS	
Display Language	
Sys 1 Switch	
Sys 2 Switch	
Chilled Liquid	
* Ambient Control	
Local/Remote Mode	
Control Mode	
Display Units	
* Lead/Lag Control	
* Fan Control	
Manual Override	
Current Feedback	
** Soft Start	
** Unit Type	
** Refrigerant Type	
** Expansion Valve Type	
COOLING SETPOINTS	
Cooling Setpoint	
Range	
EMS-PWM Max. Setpoint	
PROGRAM	
Discharge Pressure Cutout	
Suct. Pressure Cutout	
Low Amb. Temp. Cutout	
Leaving Liquid Temp. Cutout	
Anti-Recycle Time	
Fan Control On Pressure	
Fan Differential Off Pressure	
Total # of Compressors	
* Number of Fans/System	
* Unit/Sys Voltage	
Unit ID	
* Sys 1 Superheat Setpoint	
* Sys 2 Superheat Setpoint	

* NOT ON ALL MODELS
** VIEWABLE ONLY

❑ 4. Put the unit into Service Mode (as described under the Control Service and Troubleshooting section) and cycle each condenser fan to ensure proper rotation.

❑ 5. Prior to this step, turn system 2 off *(if applicable –refer to Option 2 under "Unit Keys" section for more information on system switches)*. Connect a manifold gauge to system 1 suction and discharge service valves.

Place the Unit Switch in the control panel to the "ON" position. As each compressor cycles on, ensure that the discharge pressure rises and the suction pressure decreases. If this does not occur, the compressor being tested is operating in the reverse direction and must be corrected. After verifying proper compressor rotation, turn the Unit Switch to "OFF."

The chilled liquid setpoint may need to be temporarily lowered to ensure all compressors cycle "on."

This unit uses scroll compressors which can only operate in one direction. Failure to observe this will lead to compressor failure.

❑ 6. YCAL0041 - YCAL0071 units only – Turn system 1 "OFF" and system 2 "ON" *(refer to Option 2 under "UNIT KEYS" section for more information on system switches)*.

Place the Unit Switch in the control panel to the "ON" position. As each compressor cycles "ON", ensure that the discharge pressure rises and the suction pressure decreases. If this does not occur, the compressor being tested is operating in the reverse direction and must be corrected. After verifying proper compressor rotation, turn the Unit Switch to "OFF".

The chilled liquid setpoint may need to be temporarily lowered to ensure all compressors cycle "ON".

5

CHECKING SUPERHEAT AND SUBCOOLING

The subcooling temperature of each system can be calculated by recording the temperature of the liquid line at the outlet of the condenser and subtracting it from the liquid line saturation temperature at the liquid stop valve (liquid line saturation temp. is converted from a temperature/pressure chart).

Example:

Liquid line pressure =	
202 PSIG converted to temp.	102°F
minus liquid line temp.	- 87°F
Subcooling =	15°F

The subcooling should be adjusted to 15°F at design conditions.

❑ 1. Record the liquid line pressure and its corresponding temperature, liquid line temperature and subcooling below:

	SYS 1	SYS 2	
Liq Line Press =	_____	_____	PSIG
Saturated Temp =	_____	_____	°F
Liq Line Temp =	_____	_____	°F
Subcooling =	_____	_____	°F

After the subcooling is verified, the suction superheat should be checked. The superheat should be checked only after steady state operation of the chiller has been established, the leaving water temperature has been pulled down to the required leaving water temperature, and the unit is running in a fully loaded condition. Correct superheat setting for a system is 10°F - 15°F (5.56°C - 8.33°C) 18" (46 cm) from the cooler.

Superheat should typically be set for no less than 10°F with only a single compressor running on a circuit. The superheat is calculated as the difference between the actual temperature of the returned refrigerant gas in the suction line entering the compressor and the temperature corresponding to the suction pressure as shown in a standard pressure/temperature chart.

Example:

Suction Temp =	46°F
minus Suction Press	
60 PSIG converted to Temp	- 34°F
Superheat =	12°F

When adjusting the expansion valve (TXV only), the adjusting screw should be turned not more than one turn at a time, allowing sufficient time (approximately 15 minutes) between adjustments for the system and the thermal expansion valve to respond and stabilize.

The EEV is non-adjustable. Superheat setpoint is programmable from the keypad.

Assure that superheat is set at a minimum of 10°F (5.56°C) with a single compressor running on each circuit.

❑ 2. Record the suction temperature, suction pressure, suction saturation temperature, and superheat of each system below:

	SYS 1	SYS 2	
Suction Temp =	_____	_____	°F
Suction Pressure =	_____	_____	PSIG
Saturation Temp =	_____	_____	°F
Superheat =	_____	_____	°F

LEAK CHECKING

❑ 1. Leak check compressors, fittings, and piping to ensure no leaks.

If the unit is functioning satisfactorily during the initial operating period, no safeties trip and the compressors cycle to control water temperature to setpoint, the chiller is ready to be placed into operation.

UNIT OPERATING SEQUENCE

The operating sequence described below relates to operation on a hot water start after power has been applied, such as start-up commissioning. When a compressor starts, internal timers limit the minimum time before another compressor can start to 1 minute.

1. For the chiller system to run, the Flow Switch must be closed, any remote cycling contacts must be closed, the Daily Schedule must not be scheduling the chiller off, and temperature demand must be present.

2. When power is applied to the system, the microprocessor will start a 2 minute timer. This is the same timer that prevents an instantaneous start after a power failure.

3. At the end of the 2 minute timer, the microprocessor will check for cooling demand. If all conditions allow for start, a compressor on the lead system will start and the liquid line solenoid will open or the EEV will begin to operate (EEV equipped chillers only). Coincident with the start, the anti-coincident timer will be set and begin counting downward from “60” seconds to “0” seconds.

   If the unit is programmed for Auto Lead/Lag, the system with the shortest average run-time of the compressors will be assigned as the “lead” system. A new lead/lag assignment is made whenever all systems shut down.

4. Several seconds after the compressor starts, that systems first condenser fan will be cycled on (outdoor air temperature > 25°F (-4°C) or discharge pressure). *See the section on Operating Controls for details concerning condenser fan cycling.*

5. After 1 minute of compressor run time, the next compressor in sequence will start when a system has to load. Additional compressors will be started at 60 second intervals as needed to satisfy temperature setpoint.

6. If demand requires, the lag system will cycle on with the same timing sequences as the lead system after the lead system has run for five minutes. *Refer to the section on Capacity Control for a detailed explanation of system and compressor staging.*

7. As the load decreases below setpoint, the compressors will be shut down in sequence. This will occur at intervals of either 60, 30, or 20 seconds based on water temperature as compared to setpoint, and control mode. *See the section on Capacity Control for a detailed explanation.*

8. When the last compressor in a “system” (two or three compressors per system), is to be cycled off, the system will initiate a pump-down. Each “system” has a pump-down feature upon shut-off. On a non-safety, non-unit switch shutdown, the LLSV will be turned off or the EEV will close (EEV equipped chillers only), and the last compressor will be allowed to run until the suction pressure falls below the suction pressure cutout or for 180 seconds, whichever comes first.

SECTION 6 - TECHNICAL DATA

OPERATIONAL LIMITATIONS (ENGLISH)

TABLE 2 – TEMPERATURES AND FLOWS

ENGLISH						
YCAL	LEAVING WATER TEMPERATURE (°F)		COOLER FLOW (GPM)		AIR ON CONDENSER (°F)	
	MIN	MAX	MIN	MAX	MIN	MAX
0041	40	55	40	200	0	125
0045	40	55	40	200	0	125
0051	40	55	40	200	0	125
0055	40	55	60	300	0	125
0061	40	55	60	300	0	125
0065	40	55	60	300	0	125
0071	40	55	60	300	0	125

VOLTAGE LIMITATIONS

The following voltage limitations are absolute and operation beyond these limitations may cause serious damage to the compressor.

Excessive flow will cause damage to the cooler. Do not exceed max. cooler flow. Special care should be taken when multiple chillers are fed by a single pump.

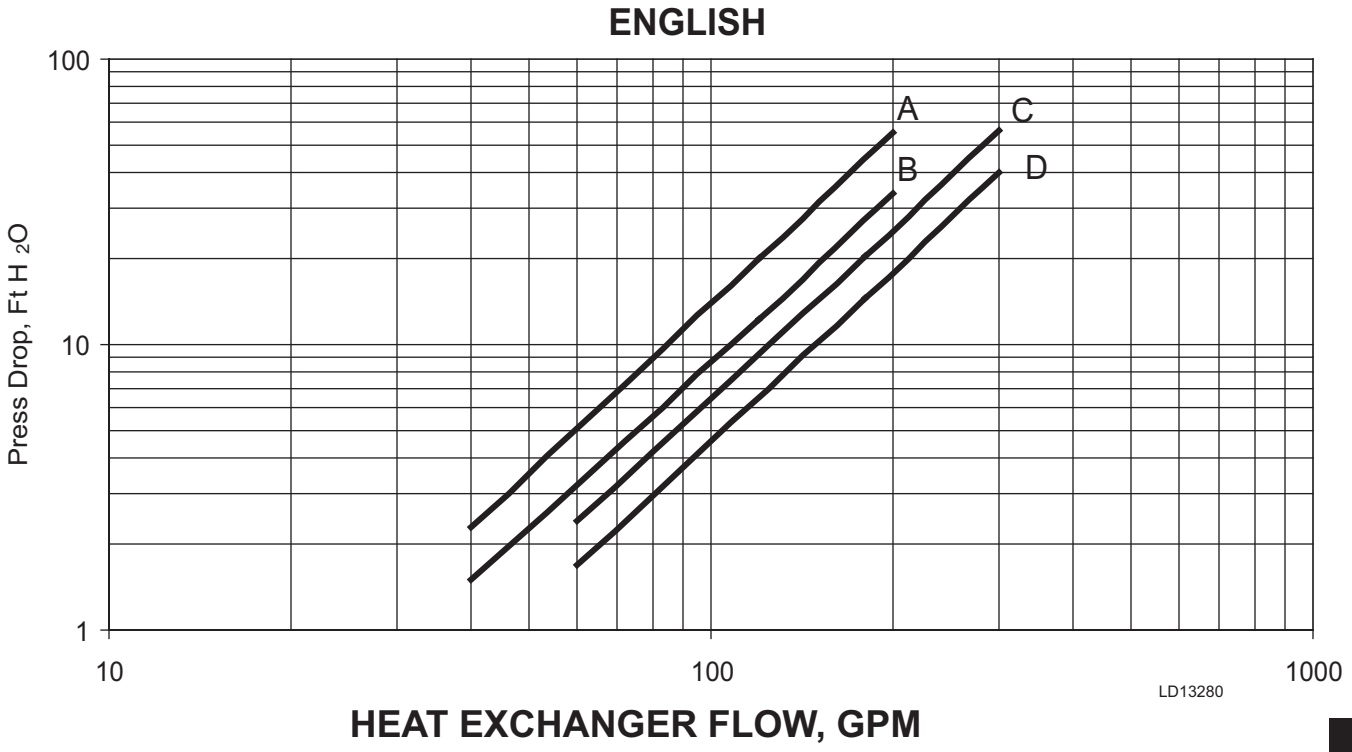
TABLE 3 – VOLTAGE LIMITATIONS

UNIT POWER	MIN.	MAX.
200-3-60	180	220
230-3-60	207	253
380-3-60	355	415
460-3-60	414	506
575-3-60	517	633

NOTES:

1. For leaving brine temperature below 40°F (4.4°C), contact your nearest YORK Office for application requirements.
2. For leaving water temperature higher than 55°F (12.8°C), contact the nearest YORK Office for application guidelines.
3. The evaporator is protected against freezing to -20°F (-28.8°C) with an electric heater as standard.
4. For operation at temperatures below 25°F (-3.9°C), the optional Low Ambient Kit will need to be installed on the system.
5. For operation at temperatures above 115°F (46.1°C), the optional High Ambient Kit will need to be installed on the system.

OPERATIONAL LIMITATIONS (ENGLISH)



MODEL YCAL	COOLER CURVE
0041	A
0045,0051	B
0055	C
0061,0065, 0071	D

TABLE 4 – ETHYLENE GLYCOL CORRECTION FACTORS

% WT ETHYLENE GLYCOL	FACTORS				FREEZE POINT (°F)
	TONS	COMPR. kW	DELTA P	GPM/°F/ TON	
10	.994	.997	1.03	24.1	26
20	.986	.993	1.06	24.9	16
30	.979	.990	1.09	25.9	5
40	.970	.985	1.13	27.3	-10
50	.959	.980	1.16	29.0	-32

OPERATIONAL LIMITATIONS (SI)

TABLE 5 – TEMPERATURES AND FLOWS (SI)

SI UNITS						
YCAL	LEAVING WATER TEMPERATURE (°DC)		COOLER FLOW (L/S)		AIR ON CONDENSER (°C)	
	MIN	MAX	MIN	MAX	MIN	MAX
0041	4.4	12.8	2.5	12.6	-17.7	51.7
0045	4.4	12.8	2.5	12.6	-17.7	51.7
0051	4.4	12.8	2.5	12.6	-17.7	51.7
0055	4.4	12.8	3.8	18.9	-17.7	51.7
0061	4.4	12.8	3.8	18.9	-17.7	51.7
0065	4.4	12.8	3.8	18.9	-17.7	51.7
0071	4.4	12.8	3.8	18.9	-17.7	51.7

VOLTAGE LIMITATIONS

The following voltage limitations are absolute and operation beyond these limitations may cause serious damage to the compressor.

Excessive flow will cause damage to the cooler. Do not exceed max. cooler flow. Special care should be taken when multiple chillers are fed by a single pump.

TABLE 6 – VOLTAGE LIMITATIONS

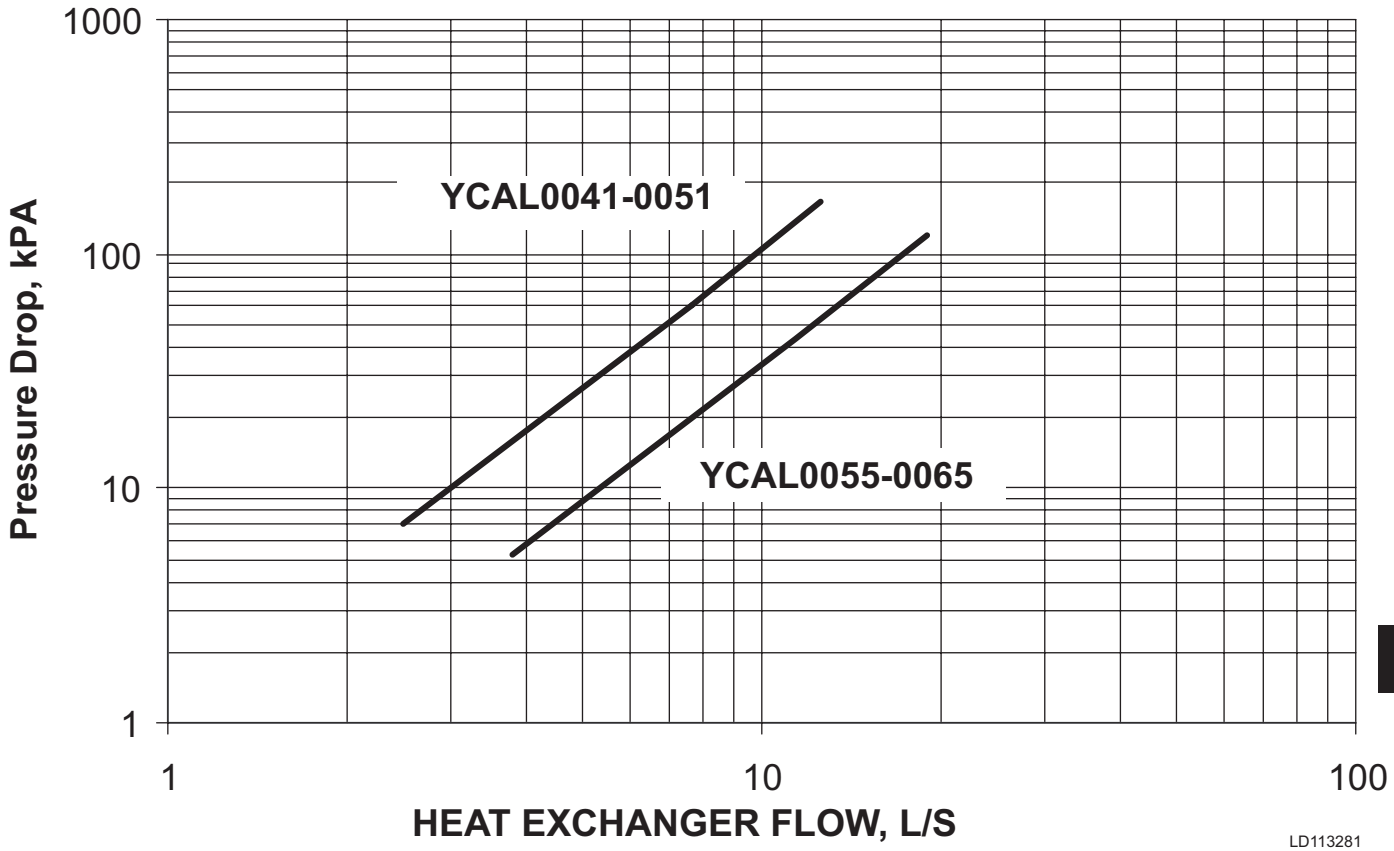
UNIT POWER	MIN.	MAX.
200-3-60	180	220
230-3-60	207	253
380-3-60	355	415
460-3-60	414	506
575-3-60	517	633

NOTES:

1. For leaving brine temperature below 40°F (4.4°C), contact your nearest YORK Office for application requirements.
2. For leaving water temperature higher than 55°F (12.8°C), contact the nearest YORK Office for application guidelines.
3. The evaporator is protected against freezing to -20°F (-28.8°C) with an electric heater as standard.
4. For operation at temperatures below 25°F (-3.9°C), the optional Low Ambient Kit will need to be installed on the system.
5. For operation at temperatures above 115°F (46.1°C), the optional High Ambient Kit will need to be installed on the system.

OPERATIONAL LIMITATIONS (SI)

SI



LD113281

MODEL YCAL	COOLER CURVE
0041	A
0045,0051	B
0055	C
0061,0065, 0071	D

TABLE 7 – ETHYLENE GLYCOL CORRECTION FACTORS

% WT ETHYLENE GLYCOL	FACTORS				FREEZE POINT (°F)
	TONS	COMPR. kW	DELTA P	GPM/°F/ TON	
10	.994	.997	1.03	24.1	26
20	.986	.993	1.06	24.9	16
30	.979	.990	1.09	25.9	5
40	.970	.985	1.13	27.3	-10
50	.959	.980	1.16	29.0	-32

PHYSICAL DATA (ENGLISH)
YCAL0041_ - YCAL0071_

TABLE 8 – PHYSICAL DATA (ENGLISH)

60Hz

YCAL Model No.	Dimension			General Unit Data								Nominal Compressor Capacity						
	Length	Width	Height	Nom. Tons, R-22	Number Of Refrig. Circuits	Refrig.Charge, Operating, R-22 (Lbs)	Oil Charge, Gallons	Shipping Weight		Operating Weight		Circuit 1			Ciruict 2			
						Ckt1/Ckt2	Ckt1/ckt2	Aluminum Fin Coils, Lbs	Copper Fin Coils, Lbs	Aluminum Fin Coils, Lbs	Copper Fin Coils, Lbs	Comp. 1	Comp. 2	Comp. 3	Comp. 4	Comp. 5	Comp. 6	
0041	144.8	90.6	47.75	34.9	2	35/35	1.7/1.7	2942	3300	2967	3325	10	10	–	10	10	–	
0045	144.8	90.6	47.75	38.0	2	40/35	1.7/1.7	2968	3326	3001	3359	12	12	–	10	10	–	
0051	144.8	90.6	47.75	43.4	2	40/45	1.7/2.2	3448	3985	3480	4017	12	12	–	13	15	–	
0055	144.8	90.6	62.6	47.4	2	50/50	2.2/2.2	3558	4035	3595	4073	15	13	–	13	15	–	
0061	144.8	90.6	62.6	56.0	2	65/55	2.2/2.2	3863	4436	3908	4481	20	15	–	15	15	–	
0065	153.6	90.6	62.6	61.0	2	65/60	2.2/2.2	4097	4703	4142	4748	20	20	–	15	15	–	
0071	153.6	90.6	62.6	65.0	2	65/70	2.2/2.2	4257	5047	4302	5092	20	15	–	20	20	–	

PHYSICAL DATA (ENGLISH) (CON'T)
YCAL0041_ - YCAL0071_

60Hz

	Condenser			Condenser Fans, Low Sound				Condenser Fans, Ultra Quiet				Evaporator					
	Total Face Area Ft^2	Number Of Rows Ckt1/Ckt2	Fins Per Inch	Number Of Fans Ckt1/Ckt2	Fan Power HP/fan	Fan RPM	Total Chiller CFM	Number Of Fans Ckt1/Ckt2	Fan HP	Fan RPM	Total Chiller CFM	Water Volume, Gallons	Max. Water Side Press., PSIG	Max. Refrig. Side Press., PSIG	Min. Chiller Water Flow Rate, GPM	Max. Chiller Water Flow Rate, GPM	Nominal Water Connections Size, Inches
	87.0	2/2	17	2/2	2	1140	47400	2/2	2	838	47400	2.7	300	450	40	200	3
	87.0	2/2	17	2/2	2	1140	47400	2/2	2	838	47400	3.5	300	450	40	200	3
	87.0	3/3	17	2/2	2	1140	47400	2/2	2	838	47400	3.5	300	450	40	200	3
	116.0	2/2	17	2/2	2	1140	52000	2/2	2	838	52000	4.1	300	450	60	300	3
	116.0	3/2	17	2/2	2	1140	52000	2/2	2	838	52000	4.9	300	450	60	300	3
	128.0	3/3	13	2/2	2	1140	52000	2/2	2	838	52000	4.9	300	450	60	300	3
	128.0	3/3	17	2/2	2	1140	52000	2/2	2	838	52000	4.9	300	450	60	300	3

SOUND DATA (ENGLISH)
YCAL0041_ - YCAL0071_

TABLE 9 – SOUND DATA (ENGLISH)

60Hz Line Frequency LOW NOISE FAN R-22									
	63	125	250	500	1000	2000	4000	8000	dBA
YCAL0041	92	91	92	90	86	81	77	74	92
YCAL0045	92	91	92	90	86	81	77	74	92
YCAL0051	91	92	92	91	87	82	79	75	92
YCAL0055	93	95	95	93	90	85	81	77	95
YCAL0061	93	95	95	93	90	86	82	77	95
YCAL0065	94	94	95	93	90	86	82	77	95
YCAL0071	DATA NOT AVAILABLE								

60Hz Line Frequency LOW NOISE FAN WITH COMPRESSOR SOUND BLANKETS INSTALLED R-22									
	63	125	250	500	1000	2000	4000	8000	dBA
YCAL0041	92	91	93	90	86	81	77	73	91
YCAL0045	92	91	93	90	86	81	77	73	91
YCAL0051	91	92	93	90	86	81	77	73	91
YCAL0055	93	95	95	93	89	84	80	76	94
YCAL0061	93	95	95	93	89	84	80	76	94
YCAL0065	94	94	95	93	89	84	80	75	94
YCAL0071	DATA NOT AVAILABLE								

60Hz Line Frequency ULTRA QUIET FAN R-22									
	63	125	250	500	1000	2000	4000	8000	dBA
YCAL0041	96	91	90	89	86	81	78	76	91
YCAL0045	96	91	90	89	86	81	78	76	91
YCAL0051	96	92	91	89	86	82	78	77	91
YCAL0055	96	93	91	90	87	83	79	77	92
YCAL0061	96	93	91	90	87	84	80	77	92
YCAL0065	96	92	91	90	87	84	81	77	92
YCAL0071	DATA NOT AVAILABLE								

60Hz Line Frequency ULTRA QUIET FAN WITH COMPRESSOR SOUND BLANKETS INSTALLED R-22									
	63	125	250	500	1000	2000	4000	8000	dBA
YCAL0041	96	91	90	88	85	80	77	75	90
YCAL0045	96	91	90	88	85	80	77	75	90
YCAL0051	96	92	91	88	85	80	77	75	90
YCAL0055	96	93	91	89	85	81	77	76	91
YCAL0061	96	93	91	89	85	81	78	76	91
YCAL0065	96	92	91	89	86	81	78	75	91
YCAL0071	DATA NOT AVAILABLE								

SOUND DATA (ENGLISH)
YCAL0041_ - YCAL0071_

60Hz Line Frequency LOW NOISE FAN (STANDARD) R-22									
	63	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**dBA**
YCAL0041	92	91	92	90	86	81	77	74	92
YCAL0045	92	91	92	90	86	81	77	74	92
YCAL0051	91	92	92	91	87	82	78	75	92
YCAL0055	93	95	95	93	90	85	81	77	95
YCAL0061	93	95	95	93	90	86	82	77	95
YCAL0065	94	94	95	93	90	86	82	77	95
YCAL0071	DATA NOT AVAILABLE								

60Hz Line Frequency LOW NOISE FAN WITH COMPRESSOR SOUND BLANKETS INSTALLED R-22									
	63	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**dBA**
YCAL0041	92	91	92	90	86	81	77	73	91
YCAL0045	92	91	92	90	86	81	77	73	91
YCAL0051	91	92	92	90	86	81	77	73	91
YCAL0055	93	95	95	93	89	84	80	76	94
YCAL0061	93	95	95	93	89	84	80	76	94
YCAL0065	94	94	95	93	89	84	80	75	94
YCAL0071	DATA NOT AVAILABLE								

60Hz Line Frequency ULTRA QUIET FAN (OPTIONAL) R-22									
	63	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**dBA**
YCAL0041	94	88	88	87	83	79	75	74	88
YCAL0045	94	88	88	87	83	79	75	74	88
YCAL0051	94	90	89	88	84	80	76	75	90
YCAL0055	96	93	91	90	87	83	79	77	92
YCAL0061	96	93	91	90	87	84	80	77	92
YCAL0065	96	92	91	90	87	84	81	77	92
YCAL0071	DATA NOT AVAILABLE								

60Hz Line Frequency ULTRA QUIET FAN WITH COMPRESSOR SOUND BLANKETS INSTALLED R-22									
	63	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**dBA**
YCAL0041	94	88	88	85	82	77	74	73	87
YCAL0045	94	88	88	85	82	77	74	73	87
YCAL0051	94	90	89	86	83	78	74	73	88
YCAL0055	96	93	91	89	85	81	77	76	91
YCAL0061	96	93	91	89	85	81	78	76	91
YCAL0065	96	92	91	89	86	81	78	75	91
YCAL0071	DATA NOT AVAILABLE								

ELCTRICAL DATA (ENGLISH)
YCAL0041_ - YCAL0071_

SINGLE POINT FIELD SUPPLIED POWER WIRING *(See Fig. 2)*
(One Field Provided Power Supply to the chiller. Field connections to Factory Provided Power Terminal Block (standard), Non-Fused Disconnect Switch (optional) or Circuit Breaker (optional)).

TABLE 10 – ELECTRICAL DATA (ENGLISH)

MODEL YCAL	VOLT/ 60Hz	MCA[1]	MIN N/F DISC SW[2]	D.E. FUSE		CKT. BKR.[5]		FIELD WIRING LUGS[6] TERMINAL BLOCK (STD)		FIELD WIRING LUGS[6] NF DISC. SWITCH (OPT)		FIELD WIRING LUGS[6] CIRCUIT BREAKER (OPT)	
				REC.	MAX[4]	REC.	MAX	LUGS/ PHASE	LUG WIRE RANGE	LUGS/ PHASE	LUG WIRE RANGE	LUGS/ PHASE	LUG WIRE RANGE
0041	200	197	250	225	225	225	225	1	6awg - 500MCM	1	6awg - 350MCM	1	6awg - 350MCM
	230	184	250	200	200	200	200	1	6awg - 500MCM	1	6awg - 350MCM	1	6awg - 350MCM
	380	107	150	125	125	125	125	1	6awg - 500MCM	1	6awg - 350MCM	1	6awg - 350MCM
	460	90	100	100	100	100	100	1	6awg - 500MCM	1	6awg - 350MCM	1	6awg - 350MCM
	575	71	100	80	80	80	80	1	6awg - 500MCM	1	6awg - 350MCM	1	6awg - 350MCM
0045	200	199	250	225	225	225	225	1	6awg - 500MCM	1	6awg - 350MCM	1	6awg - 350MCM
	230	186	250	200	200	200	200	1	6awg - 500MCM	1	6awg - 350MCM	1	6awg - 350MCM
	380	108	150	125	125	125	125	1	6awg - 500MCM	1	6awg - 350MCM	1	6awg - 350MCM
	460	91	100	100	100	100	100	1	6awg - 500MCM	1	6awg - 350MCM	1	6awg - 350MCM
	575	71	100	80	80	80	80	1	6awg - 500MCM	1	6awg - 350MCM	1	6awg - 350MCM
0051	200	228	250	250	250	250	250	1	6awg - 500MCM	2	3/0 - 250MCM	2	3/0 - 250MCM
	230	212	250	225	250	225	250	1	6awg - 500MCM	2	3/0 - 250MCM	2	3/0 - 250MCM
	380	123	150	150	150	150	150	1	6awg - 500MCM	1	6awg - 350MCM	1	6awg - 350MCM
	460	103	150	110	110	110	110	1	6awg - 500MCM	1	6awg - 350MCM	1	6awg - 350MCM
	575	81	100	90	90	90	90	1	6awg - 500MCM	1	6awg - 350MCM	1	6awg - 350MCM
0055	200	251	400	300	300	300	300	1	6awg - 500MCM	2	3/0 - 250MCM	2	3/0 - 250MCM
	230	234	400	250	300	250	300	1	6awg - 500MCM	2	3/0 - 250MCM	2	3/0 - 250MCM
	380	136	150	150	150	150	150	1	6awg - 500MCM	1	6awg - 350MCM	1	6awg - 350MCM
	460	113	150	125	125	125	125	1	6awg - 500MCM	1	6awg - 350MCM	1	6awg - 350MCM
	575	90	100	100	100	100	100	1	6awg - 500MCM	1	6awg - 350MCM	1	6awg - 350MCM
0061	200	278	400	300	300	300	300	1	6awg - 500MCM	1	250MCM - 500MCM	1	250MCM - 500MCM
	230	259	400	300	300	300	300	1	6awg - 500MCM	1	250MCM - 500MCM	1	250MCM - 500MCM
	380	150	200	175	175	175	175	1	6awg - 500MCM	1	6awg - 350MCM	1	6awg - 350MCM
	460	124	150	150	150	150	150	1	6awg - 500MCM	1	6awg - 350MCM	1	6awg - 350MCM
	575	99	150	110	110	110	110	1	6awg - 500MCM	1	6awg - 350MCM	1	6awg - 350MCM
0065	200	292	400	350	350	350	350	1	6awg - 500MCM	1	250MCM - 500MCM	1	250MCM - 500MCM
	230	272	400	300	300	300	300	1	6awg - 500MCM	1	250MCM - 500MCM	1	250MCM - 500MCM
	380	158	200	175	175	175	175	1	6awg - 500MCM	1	6awg - 350MCM	1	6awg - 350MCM
	460	132	150	150	150	150	150	1	6awg - 500MCM	1	6awg - 350MCM	1	6awg - 350MCM
	575	104	150	110	125	110	125	1	6awg - 500MCM	1	6awg - 350MCM	1	6awg - 350MCM
0071	200	307	400	350	350	*	*	*	*	*	*	*	*
	230	286	400	350	300	*	*	*	*	*	*	*	*
	380	166	200	175	200	*	*	*	*	*	*	*	*
	460	138	150	150	150	*	*	*	*	*	*	*	*
	575	109	150	125	125	*	*	*	*	*	*	*	*

* - Chiller not available at time of publication.

ELCTRICAL DATA (ENGLISH) (CON'T)
YCAL0041_ - YCAL0071_

SINGLE POINT FIELD SUPPLIED POWER WIRING *(See Fig. 2)*
(One Field Provided Power Supply to the chiller. Field connections to Factory Provided Power Terminal Block (standard), Non-Fused Disconnect Switch (optional) or Circuit Breaker (optional)).

SYSTEM #1 COMPRESSOR & FAN					SYSTEM #2 COMPRESSOR & FAN					FANS		FANS	
COMPR. #1		COMPR. #2		FANS	COMPR. #1		COMPR. #2		FANS	STANDARD FAN		OPTIONAL ULTRA LOW SOUND FAN	
RLA	LRA	RLA	LRA	QTY	RLA	LRA	RLA	LRA	QTY	FLA	RLA	FLA	RLA
39.1	250	39.1	250	2	39.1	250	39.1	250	2	7.3	44.0	8.9	22.8
36.2	250	36.2	250	2	36.2	250	36.2	250	2	6.2	17.5	6.9	22.8
20.9	155	20.9	155	2	20.9	155	20.9	155	2	3.8	23.0	4.5	12.7
17.2	125	17.2	125	2	17.2	125	17.2	125	2	2.8	17.5	3.4	21.0
13.8	100	13.8	100	2	13.8	100	13.8	100	2	2.5	15.3	3.0	8.3
40.0	250	40.0	250	2	39.1	250	39.1	250	2	7.3	44.0	8.9	22.8
37.0	250	37.0	250	2	36.2	250	36.2	250	2	6.2	17.5	6.9	22.8
21.3	155	21.3	155	2	20.9	155	20.9	155	2	3.8	23.0	4.5	12.7
17.6	125	17.6	125	2	17.2	125	17.2	125	2	2.8	17.5	3.4	21.0
14.1	100	14.1	100	2	13.8	100	13.8	100	2	2.5	15.3	3.0	8.3
40.0	350	40.0	350	2	49.4	316	53.8	374	2	7.3	44.0	8.9	22.8
37.0	350	37.0	350	2	45.8	316	49.8	374	2	6.2	17.5	6.9	22.8
21.3	195	21.3	195	2	26.4	199	28.7	235	2	3.8	23.0	4.5	12.7
17.6	167	17.6	167	2	21.8	158	23.7	187	2	2.8	17.5	3.4	21.0
14.1	125	14.1	125	2	17.4	126	19.0	150	2	2.5	15.3	3.0	8.3
53.8	374	49.4	316	2	49.4	316	53.8	374	2	7.3	44.0	8.9	22.8
49.8	374	45.8	316	2	45.8	316	49.8	374	2	6.2	17.5	6.9	22.8
28.7	235	26.4	199	2	26.4	199	28.7	235	2	3.8	23.0	4.5	12.7
23.7	187	21.8	158	2	21.8	158	23.7	187	2	2.8	17.5	3.4	21.0
19.0	150	17.4	126	2	17.4	126	19.0	150	2	2.5	15.3	3.0	8.3
68.3	505	53.8	425	2	53.8	425	53.8	425	2	7.3	44.0	8.9	22.8
63.3	505	49.8	425	2	49.8	425	49.8	425	2	6.2	17.5	6.9	22.8
36.5	280	28.7	239	2	28.7	239	28.7	239	2	3.8	23.0	4.5	12.7
30.1	225	23.7	198	2	23.7	198	23.7	198	2	2.8	17.5	3.4	21.0
24.1	180	19.0	148	2	19.0	148	19.0	148	2	2.5	15.3	3.0	8.3
68.3	505	68.3	505	2	53.8	425	53.8	425	2	7.3	44.0	8.9	22.8
63.3	505	63.3	505	2	49.8	425	49.8	425	2	6.2	17.5	6.9	22.8
36.5	280	36.5	280	2	28.7	239	28.7	239	2	3.8	23.0	4.5	12.7
30.1	225	30.1	225	2	23.7	198	23.7	198	2	2.8	17.5	3.4	21.0
24.1	180	24.1	180	2	19.0	148	19.0	148	2	2.5	15.3	3.0	8.3
68.3	505	53.8	425	*	68.3	505	68.3	505	*	7.3	44.0	8.9	22.8
63.3	505	49.8	425	*	63.3	505	63.3	505	*	6.2	17.5	6.9	22.8
36.5	280	28.7	239	*	36.5	280	36.5	280	*	3.8	23.0	4.5	12.7
30.1	225	23.7	198	*	30.1	225	30.1	225	*	2.8	17.5	3.4	21.0
24.1	180	19.0	148	*	24.1	180	24.1	180	*	2.5	15.3	3.0	8.3

6

ELECTRICAL DATA

TABLE 11 – MICRO PANEL POWER SUPPLY

UNIT VOLTAGE	UNIT VOLTAGE	CONTROL POWER	MCA NOTE A	OVER CURRENT PROTECTION, *SEE NOTE B*		NF DISC SW
				MIN	MAX	
MODELS w/o CONTROL TRANS		115-1-60/50	15A	10A	15A	30 A / 240V
MODELS w/ CONTROL TRANS	-17	200-1-60	15A	10A	15A	30 A / 240V
	-28	230-1-60	15A	10A	15A	30 A / 240V
	-40	380-1-60	15A	10A	15A	30 A / 480V
	-46	460-1-60	15A	10A	15A	30 A / 480V
	-50	380/415-1-60	15A	10A	15A	30A / 415V
	-58	575-1-60	15A	10A	15A	30 A / 600V

A. Minimum #14 AWG, 75°C, Copper Recommended
B. Minimum and Maximum Over Current Protection, Dual Element Fuse or Circuit Breaker

It is possible that multiple sources of power can be supplying the unit power panel. To prevent serious injury or death, the technician should verify that NO LETHAL VOLTAGES are present inside the panel AFTER disconnecting power, PRIOR to working on equipment.

The unit evaporator heater uses 120VAC. Disconnecting 120VAC power from the unit, at or below freezing temperatures, can result in damage to the evaporator and unit as a result of the chilled liquid freezing.

TABLE 12 – VOLTAGE RANGE

VOLTAGE RANGE			
VOLTAGE CODE	UNIT POWER	MIN.	MAX.
-17	200-3-60	180	220
-28	230-3-60	207	253
-40	380/415-3-60	342	440
-46	460-3-60	414	506
-50	380/415-3-50	342	440
-58	575-3-60	517	633

ELECTRICAL NOTES AND LEGEND

NOTES:

1. Minimum Circuit Ampacity (MCA) is based on 125% of the rated load amps for the largest motor plus 100% of the rated load amps for all other loads included in the circuit, per N.E.C. Article 430-24. If the optional Factory Mounted Control Transformer is provided, add the following MCA values to the electrical tables for the system providing power to the transformer: -17, add 2.5 amps; -28, add 2.3 amps; -40, add 1.5 amps, -46, add 1.3 amps; -58, add 1 amp.

2. The minimum recommended disconnect switch is based on 115% of the rated load amps for all loads included in the circuit, per N.E.C. Article 440.

3. Minimum fuse size is based upon 150% of the rated load amps for the largest motor plus 100% of the rated load amps for all other loads included in the circuit to avoid nuisance trips at start-up due to lock rotor amps. It is not recommended in applications where brown outs, frequent starting and stopping of the unit, and/or operation at ambient temperatures in excess of 95ºF (35ºC) is anticipated.

4. Maximum fuse size is based upon 225% of the rated load amps for the largest motor plus 100% of the rated load amps for all other loads included in the circuit, per N.E.C. Article 440-22.

5. Circuit breakers must be UL listed and CSA certified and maximum size is based on 225% of the rated load amps for the largest motor plus 100% of the rated load amps for all other loads included in the circuit. Otherwise, an HACR-type circuit breakers must be used. Maximum HACR circuit breaker rating is based on 225% of the rated load amps for the largest motor plus 100% of the rated load amps for all other loads included in the circuit.

6. The "INCOMING WIRE RANGE" is the minimum and maximum wire size that can be accommodated by the unit wiring lugs. The (2) preceding the wire range indicates the number of termination points available per phase of the wire range specified. Actual wire size and number of wires per phase must be determined based on the National Electrical Code, **using copper connectors only**. Field wiring must also comply with local codes.

7. A ground lug is provided for each compressor system to accommodate a field grounding conductor per N.E.C. Table 250-95. A control circuit grounding lug is also supplied.

8. The supplied disconnect is a "Disconnecting Means" as defined in the N.E.C. 100, and is intended for isolating the unit for the available power supply to perform maintenance and troubleshooting. This disconnect is not intended to be a Load Break Device.

9. Field Wiring by others which complies with the National Electrical Code & Local Codes.

LEGEND:

ACR-LINE	ACROSS THE LINE START
C.B.	CIRCUIT BREAKER
D.E.	DUAL ELEMENT FUSE
DISC SW	DISCONNECT SWITCH
FACT MOUNT CB	FACTORY MOUNTED CIRCUIT BREAKER
FLA	FULL LOAD AMPS
HZ	HERTZ
MAX	MAXIMUM
MCA	MINIMUM CIRCUIT AMPACITY
MIN	MINIMUM
MIN NF	MINIMUM NON-FUSED
RLA	RATED LOAD AMPS
S.P. WIRE	SINGLE POINT WIRING
UNIT MTD SERV SW	UNIT MOUNTED SERVICE (NON-FUSED DISCONNECT SWITCH)
LRA	LOCKED ROTOR AMPS

VOLTAGE CODE
-17 = 200-3-60
-28 = 230-3-60
-40 = 380-3-60
-46 = 460-3-60
-58 = 575-3-60

LEGEND:

Field Wiring — — — —

Factory Wiring ————

ELEMENTARY DIAGRAM
0041 - 0071 STANDARD LOW SOUND AND 460V ULTRA LOW SOUND

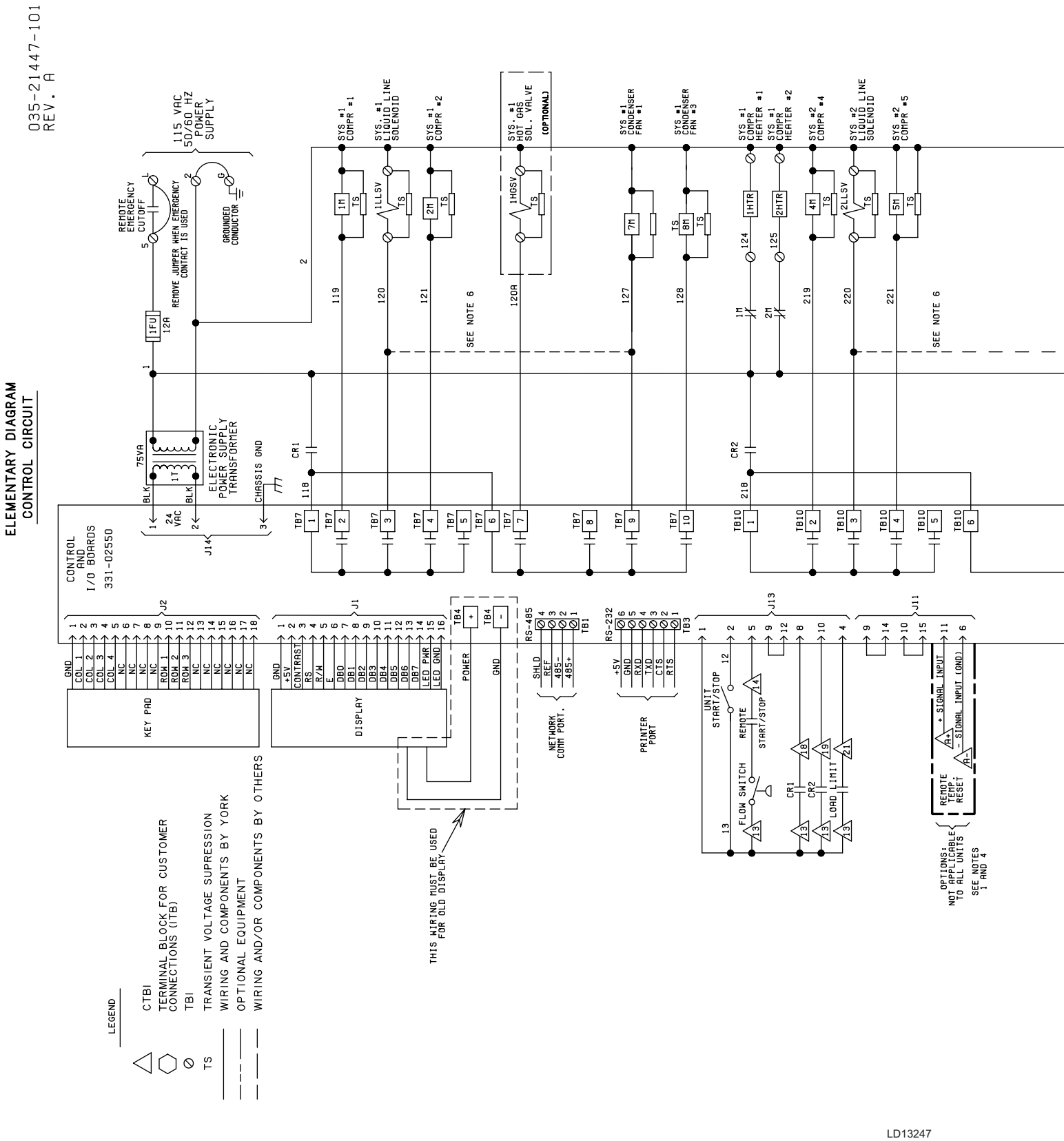
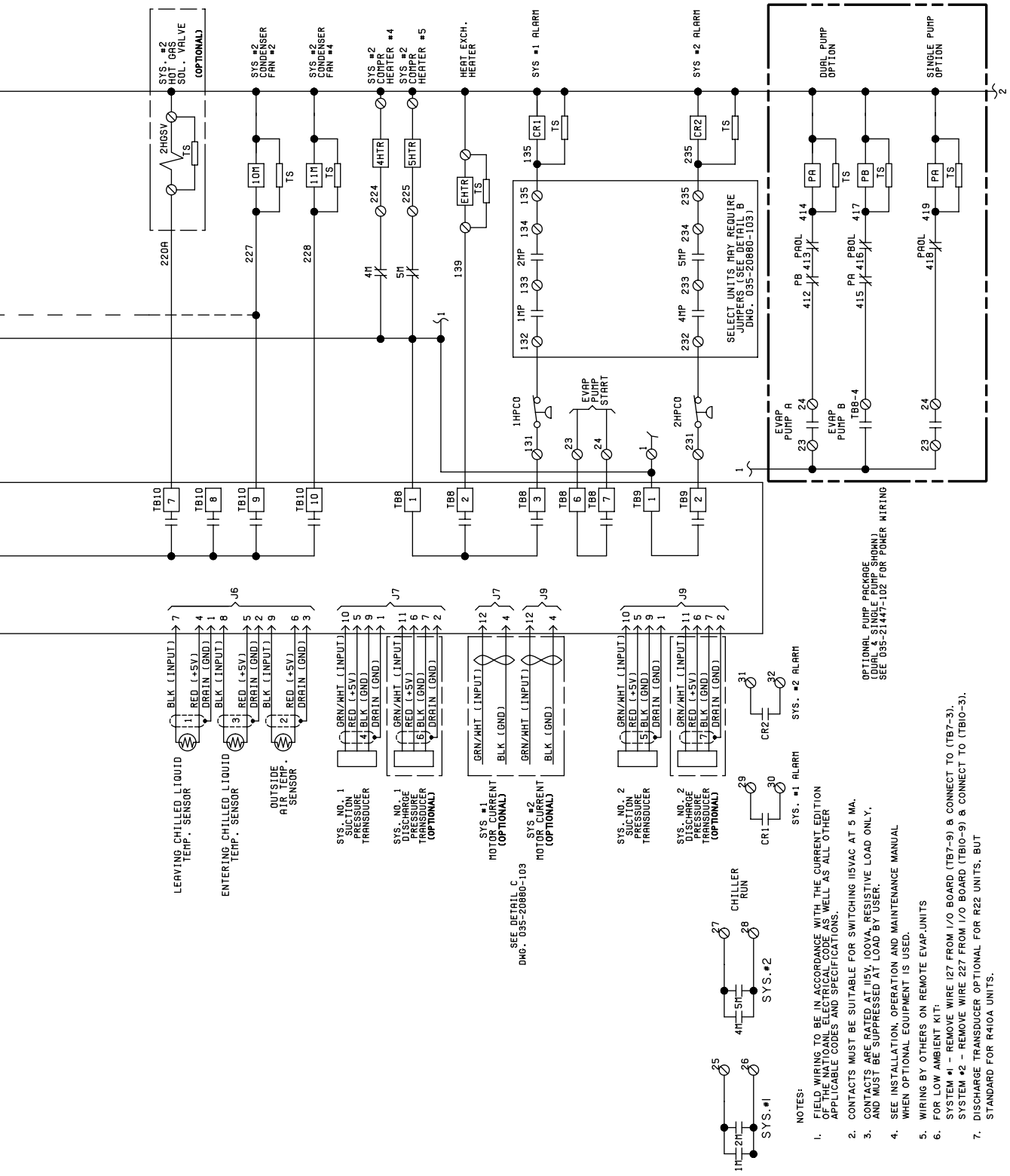


FIG. 4 – CONTROL CIRCUIT, DUAL

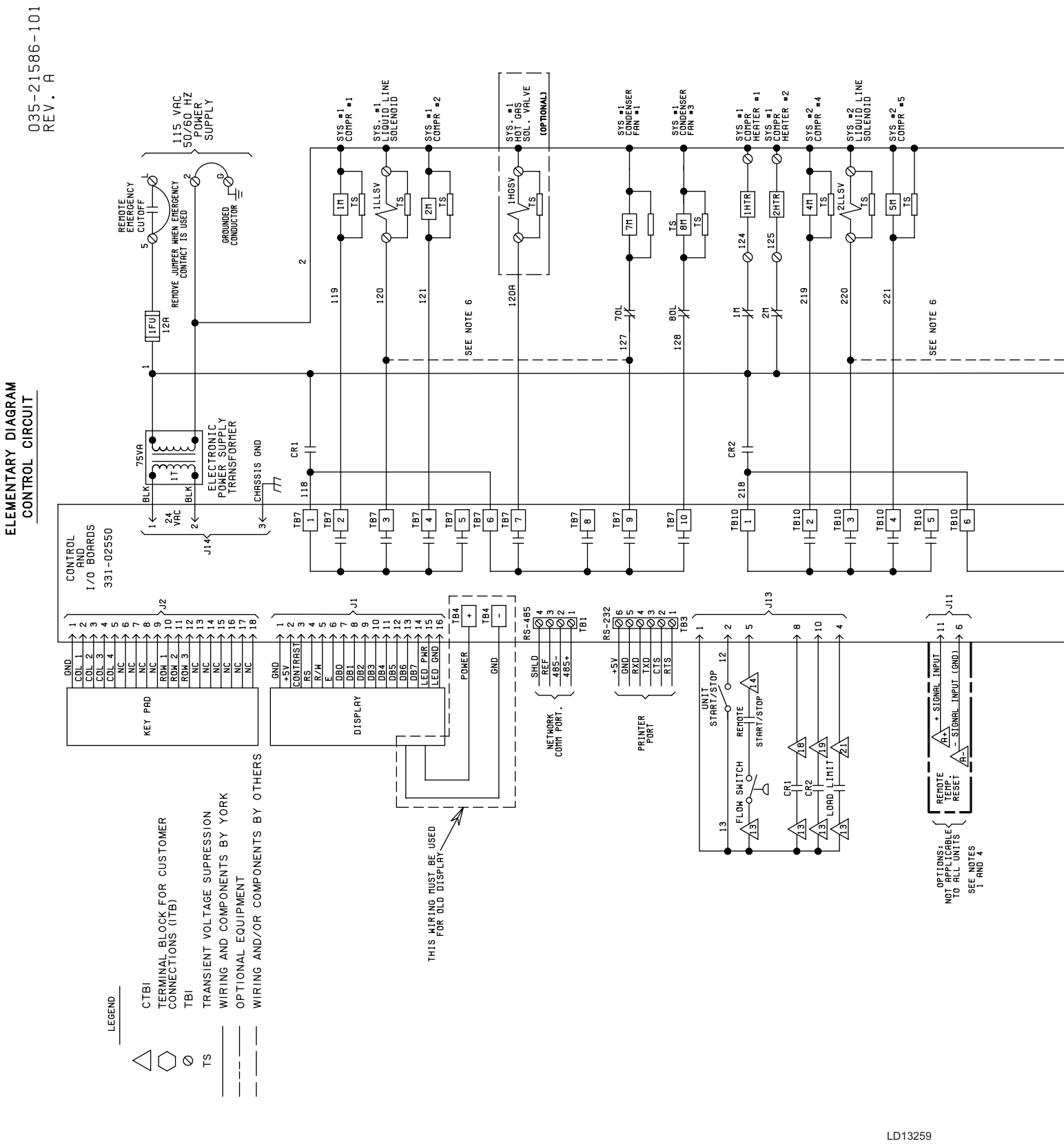
ELEMENTARY DIAGRAM (CON'T)


SYS. #2 HOT GAS SOL. VALVE (OPTIONAL)
SYS #2 CONDENSER FAN #2
SYS #2 CONDENSER FAN #4
SYS #2 COMPR HEATER #4
SYS #2 COMPR HEATER #5
HEAT EXCH. HEATER
SYS #1 ALARM
SYS #2 ALARM
DUAL PUMP OPTION
SINGLE PUMP OPTION
2HGSV
10M
11M
4HTR
5HTR
EHTR
CR1
CR2
1HPCO
2HPCO
EVAP PUMP START
EVAP PUMP A
EVAP PUMP B
SELECT UNITS MAY REQUIRE JUMPERS (SEE DETAIL B DWG. 035-20880-103)
LEAVING CHILLED LIQUID TEMP. SENSOR
ENTERING CHILLED LIQUID TEMP. SENSOR
OUTSIDE AIR TEMP. SENSOR
SYS. NO. 1 SUCTION PRESSURE TRANSDUCER
SYS. NO. 1 DISCHARGE PRESSURE TRANSDUCER (OPTIONAL)
SYS #1 MOTOR CURRENT (OPTIONAL)
SYS #2 MOTOR CURRENT (OPTIONAL)
SYS. NO. 2 SUCTION PRESSURE TRANSDUCER
SYS. NO. 2 DISCHARGE PRESSURE TRANSDUCER (OPTIONAL)
SEE DETAIL C DWG. 035-20880-103
CHILLER RUN
SYS.#1
SYS.#2
OPTIONAL PUMP PACKAGE (DUAL & SINGLE PUMP SHOWN) SEE 035-21447-102 FOR POWER WIRING
NOTES:
1. FIELD WIRING TO BE IN ACCORDANCE WITH THE CURRENT EDITION OF THE NATIONAL ELECTRICAL CODE AS WELL AS ALL OTHER APPLICABLE CODES AND SPECIFICATIONS.
2. CONTACTS MUST BE SUITABLE FOR SWITCHING 115VAC AT 5 MA.
3. CONTACTS ARE RATED AT 115V, 100VA, RESISTIVE LOAD ONLY, AND MUST BE SUPPRESSED AT LOAD BY USER.
4. SEE INSTALLATION, OPERATION AND MAINTENANCE MANUAL WHEN OPTIONAL EQUIPMENT IS USED.
5. WIRING BY OTHERS ON REMOTE EVAP.UNITS
6. FOR LOW AMBIENT KIT:
SYSTEM #1 – REMOVE WIRE 127 FROM I/O BOARD (TB7-9) & CONNECT TO (TB7-3).
SYSTEM #2 – REMOVE WIRE 227 FROM I/O BOARD (TB10-9) & CONNECT TO (TB10-3).
7. DISCHARGE TRANSDUCER OPTIONAL FOR R22 UNITS, BUT STANDARD FOR R410A UNITS.

LD13248

FIG. 4 (CON'T) - CONTROL CIRCUIT, DUAL

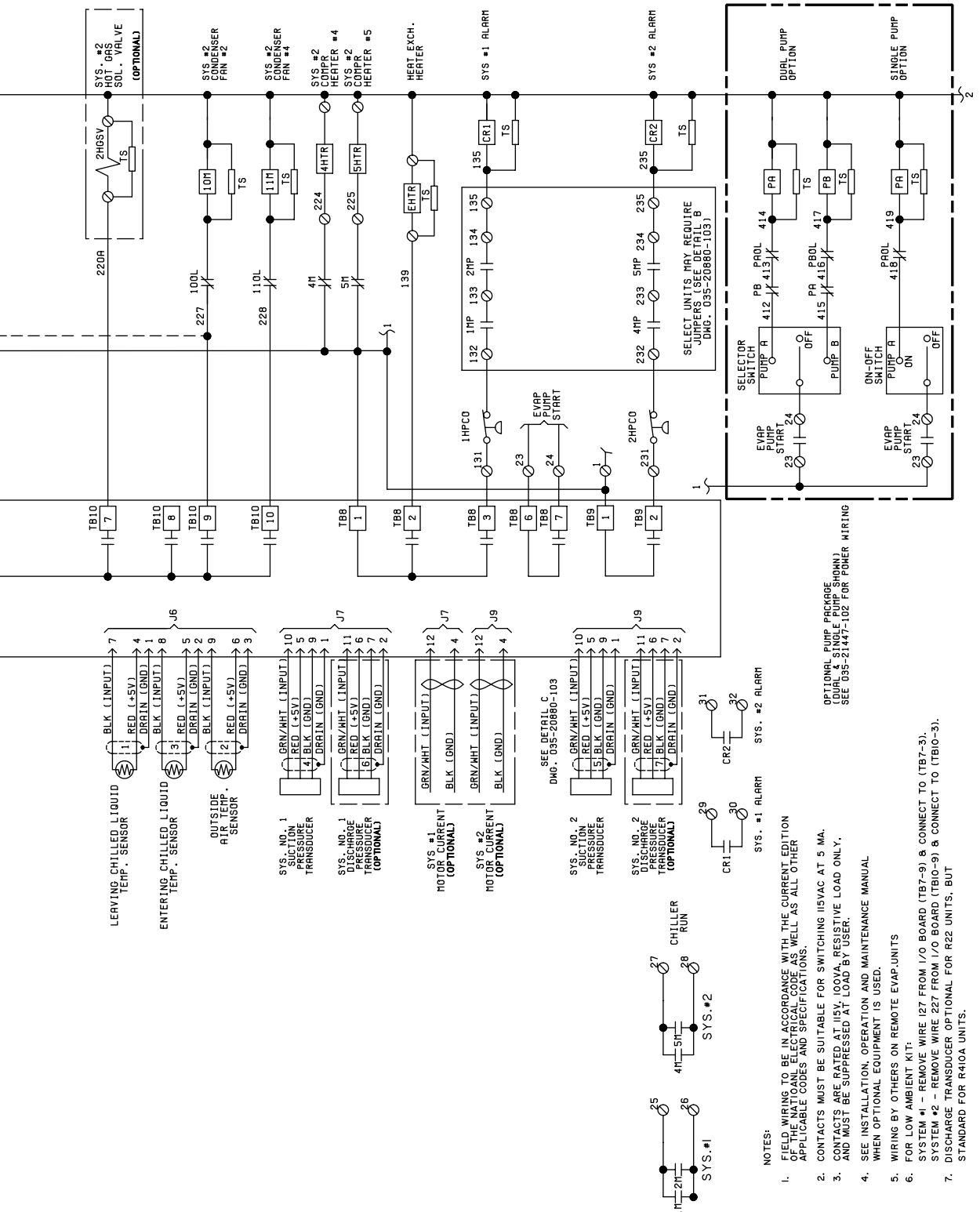
ELEMENTARY DIAGRAM
0041 - 0071 ULTRA LOW SOUND, 200V, 230V, 380V & 575V



LD13259

FIG. 5 – CONTROL CIRCUIT, DUAL

ELEMENTARY DIAGRAM (CON'T)


SYS. #2 HOT GAS SOL. VALVE (OPTIONAL)
SYS #2 CONDENSER FAN #2
SYS #2 CONDENSER FAN #4
SYS #2 COMPR HEATER #4
SYS #2 COMPR HEATER #5
HEAT EXCH. HEATER
SYS #1 ALARM
SYS #2 ALARM
DUAL PUMP OPTION
SINGLE PUMP OPTION
SELECT UNITS MAY REQUIRE JUMPERS (SEE DETAIL B DWG. 035-20880-103)
SELECTOR SWITCH
ON-OFF SWITCH
EVAP PUMP START
LEAVING CHILLED LIQUID TEMP. SENSOR
ENTERING CHILLED LIQUID TEMP. SENSOR
OUTSIDE AIR TEMP. SENSOR
SYS. NO. 1 SUCTION PRESSURE TRANSDUCER
SYS. NO. 1 DISCHARGE PRESSURE TRANSDUCER (OPTIONAL)
SYS #1 MOTOR CURRENT (OPTIONAL)
SYS #2 MOTOR CURRENT (OPTIONAL)
SEE DETAIL C DWG. 035-20880-103
SYS. NO. 2 SUCTION PRESSURE TRANSDUCER
SYS. NO. 2 DISCHARGE PRESSURE TRANSDUCER (OPTIONAL)
CHILLER RUN
OPTIONAL PUMP PACKAGE (DUAL & SINGLE PUMP SHOWN) SEE 035-21447-102 FOR POWER WIRING
NOTES:
1. FIELD WIRING TO BE IN ACCORDANCE WITH THE CURRENT EDITION OF THE NATIOANL ELECTRICAL CODE AS WELL AS ALL OTHER APPLICABLE CODES AND SPECIFICATIONS.
2. CONTACTS MUST BE SUITABLE FOR SWITCHING 115VAC AT 5 MA.
3. CONTACTS ARE RATED AT 115V, 100VA, RESISTIVE LOAD ONLY, AND MUST BE SUPPRESSED AT LOAD BY USER.
4. SEE INSTALLATION, OPERATION AND MAINTENANCE MANUAL WHEN OPTIONAL EQUIPMENT IS USED.
5. WIRING BY OTHERS ON REMOTE EVAP.UNITS
6. FOR LOW AMBIENT KIT:
SYSTEM #1 - REMOVE WIRE 127 FROM I/O BOARD (TB7-9) & CONNECT TO (TB7-3).
SYSTEM #2 - REMOVE WIRE 227 FROM I/O BOARD (TB10-9) & CONNECT TO (TB10-3).
7. DISCHARGE TRANSDUCER OPTIONAL FOR R22 UNITS, BUT STANDARD FOR R410A UNITS.

LD13260

FIG. 5 (CON'T) - CONTROL CIRCUIT, DUAL

ELEMENTARY DIAGRAM
0041 - 0071 STANDARD LOW SOUND AND 460V ULTRA LOW SOUND

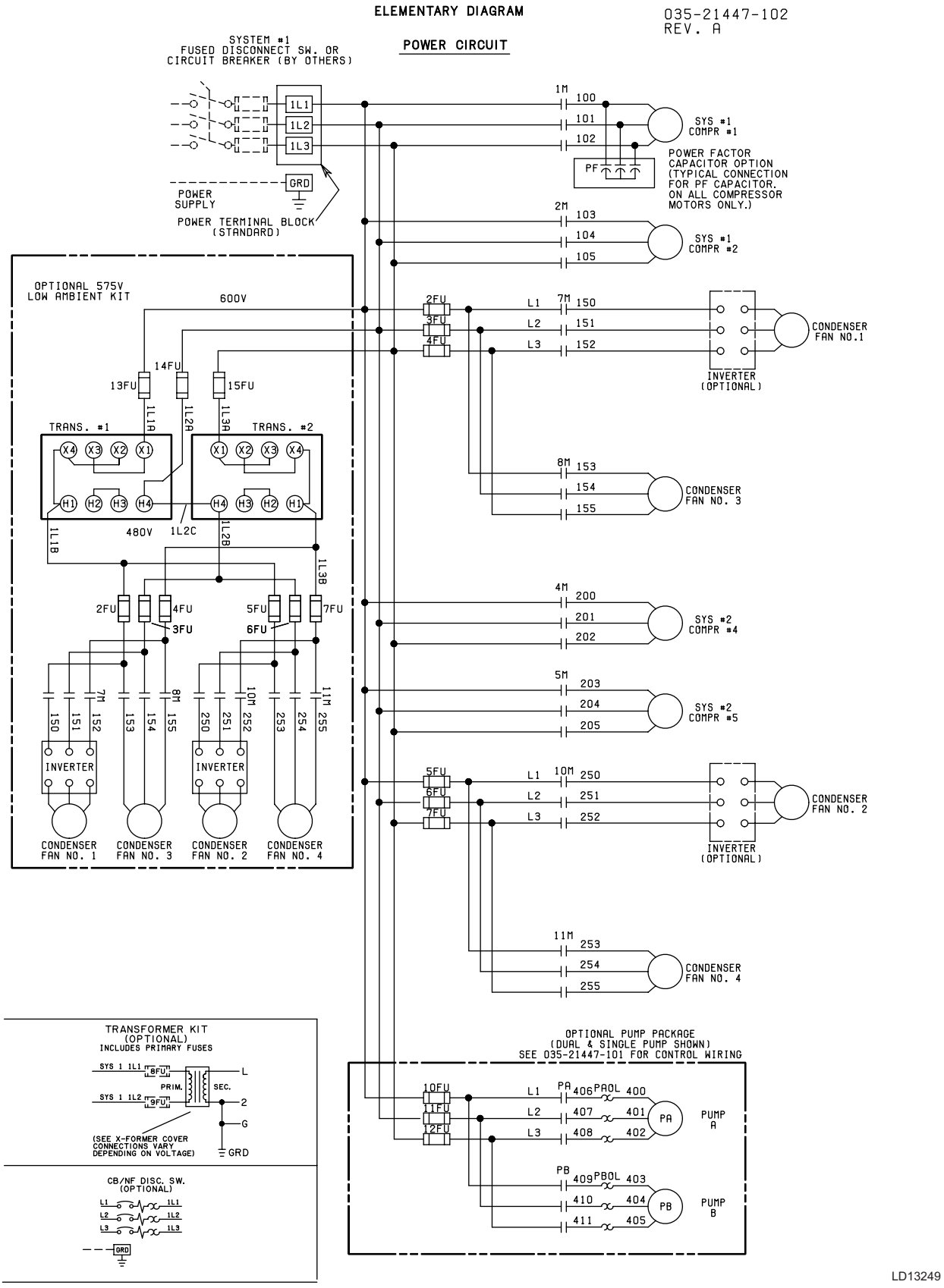
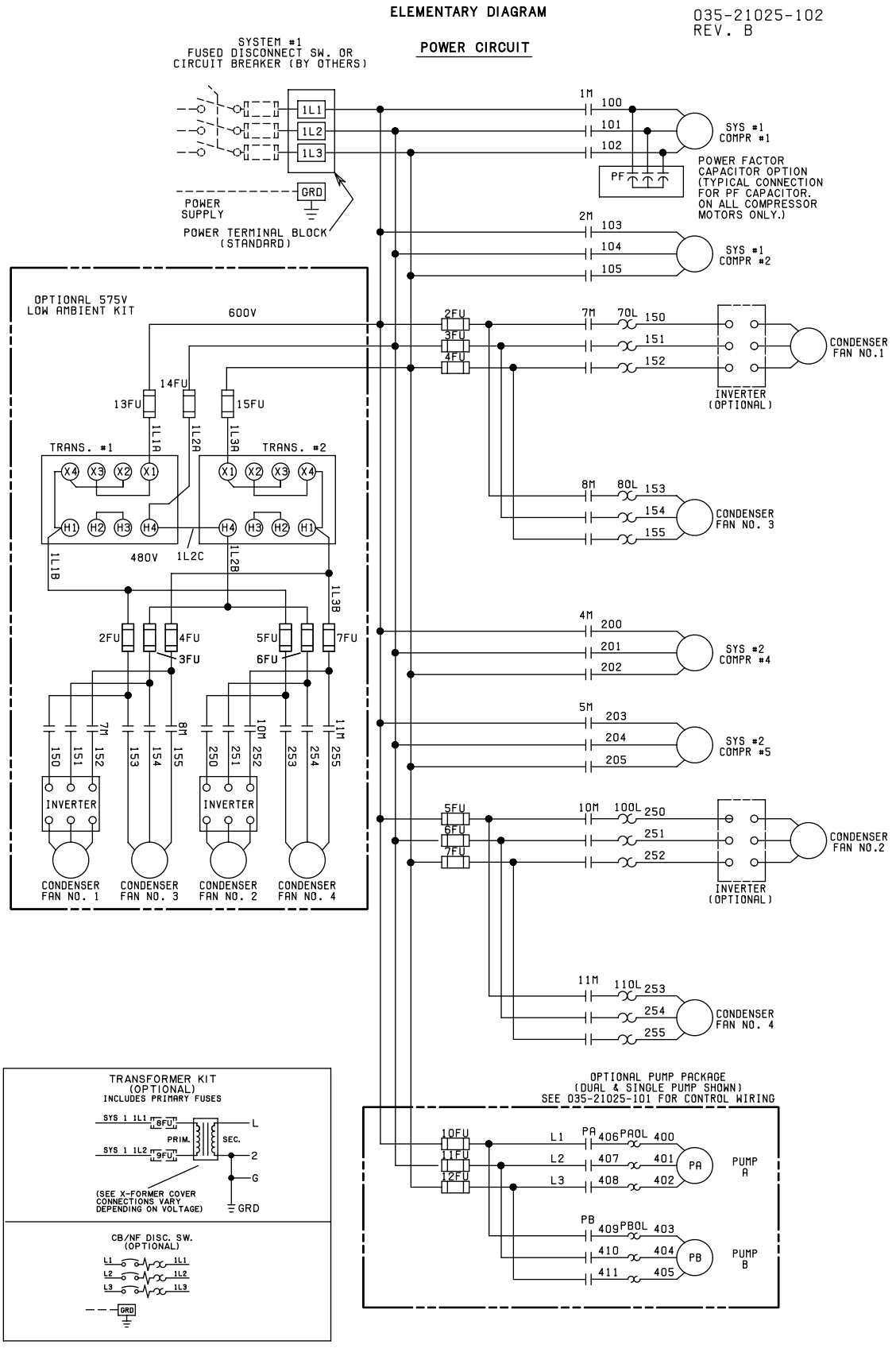


FIG. 6 – POWER CIRCUIT, DUAL

ELEMENTARY DIAGRAM
0041 - 0071 ULTRA LOW SOUND, 200V, 230V, 380V & 575V



LD13261

FIG. 7 – POWER CIRCUIT, DUAL

ELEMENTARY DIAGRAM
0041 - 0071 ULTRA LOW SOUND, ALL VOLTAGES

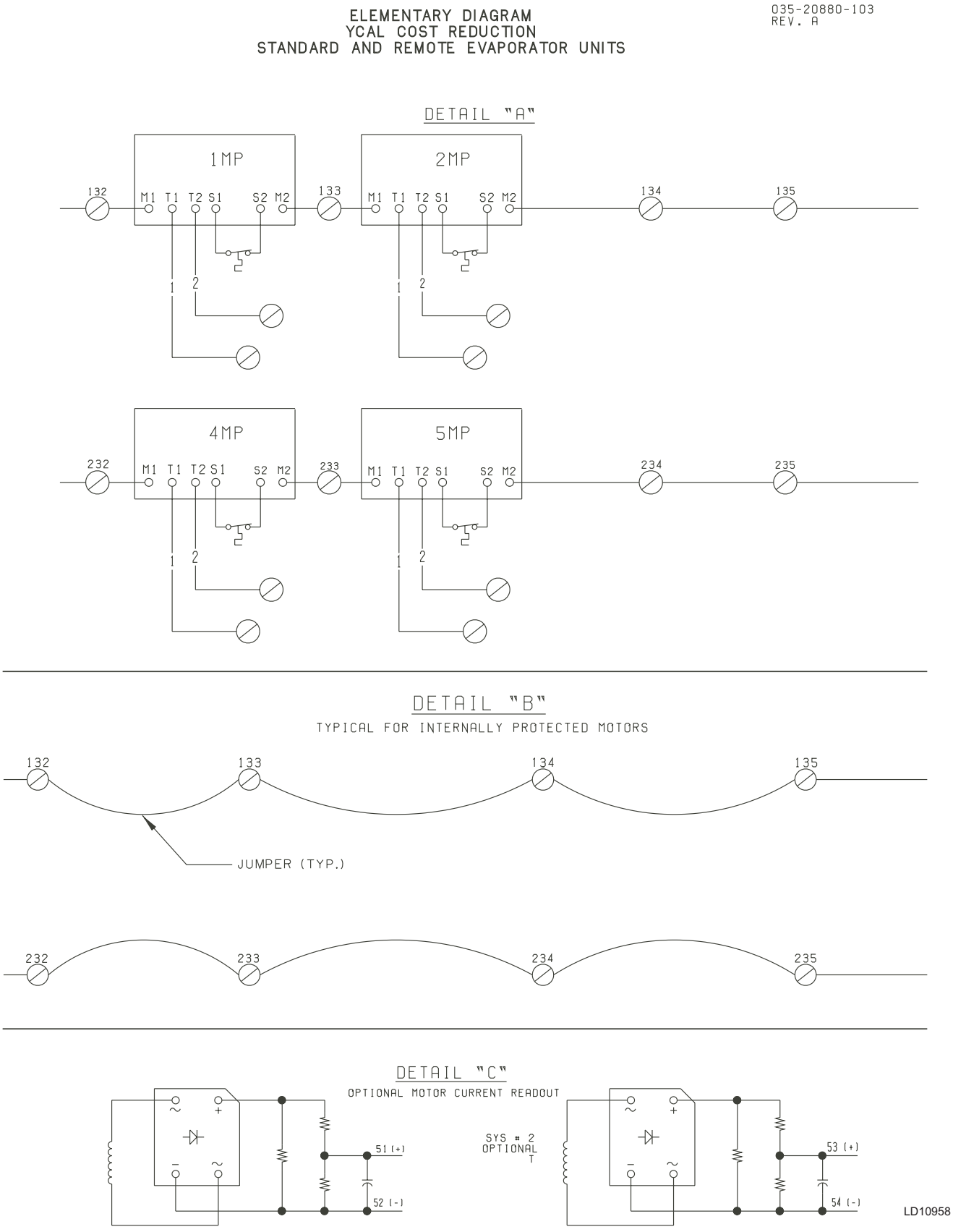


FIG. 8 – WIRING DETAILS

CONNECTION DIAGRAM
0041 - 0071 STANDARD LOW SOUND AND 460V ULTRA LOW SOUND

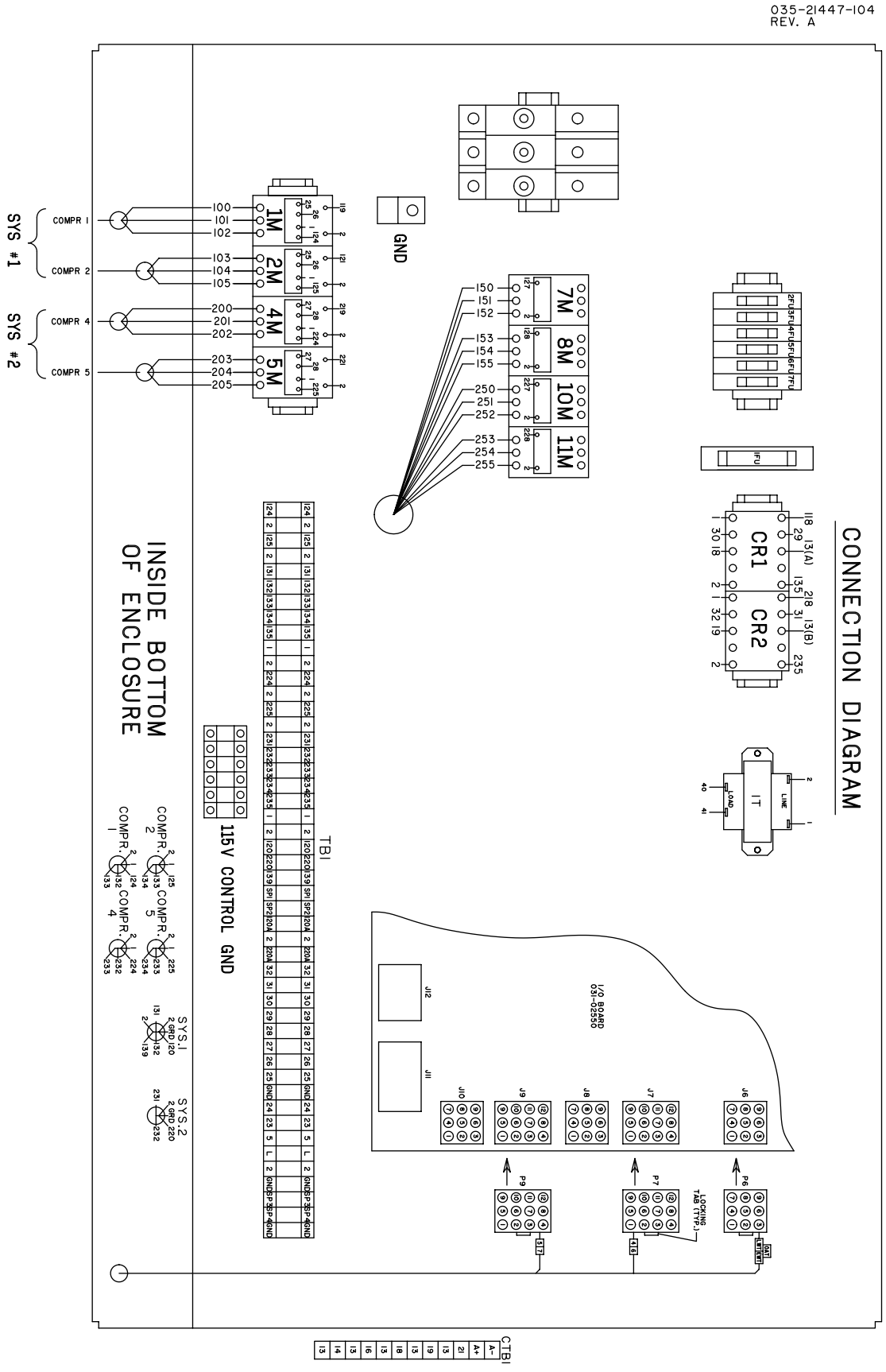


FIG. 9 – CONNECTION DIAGRAM

6

CONNECTION DIAGRAM
0041 - 0071 ULTRA LOW SOUND, 200V, 230V, 380V & 575V

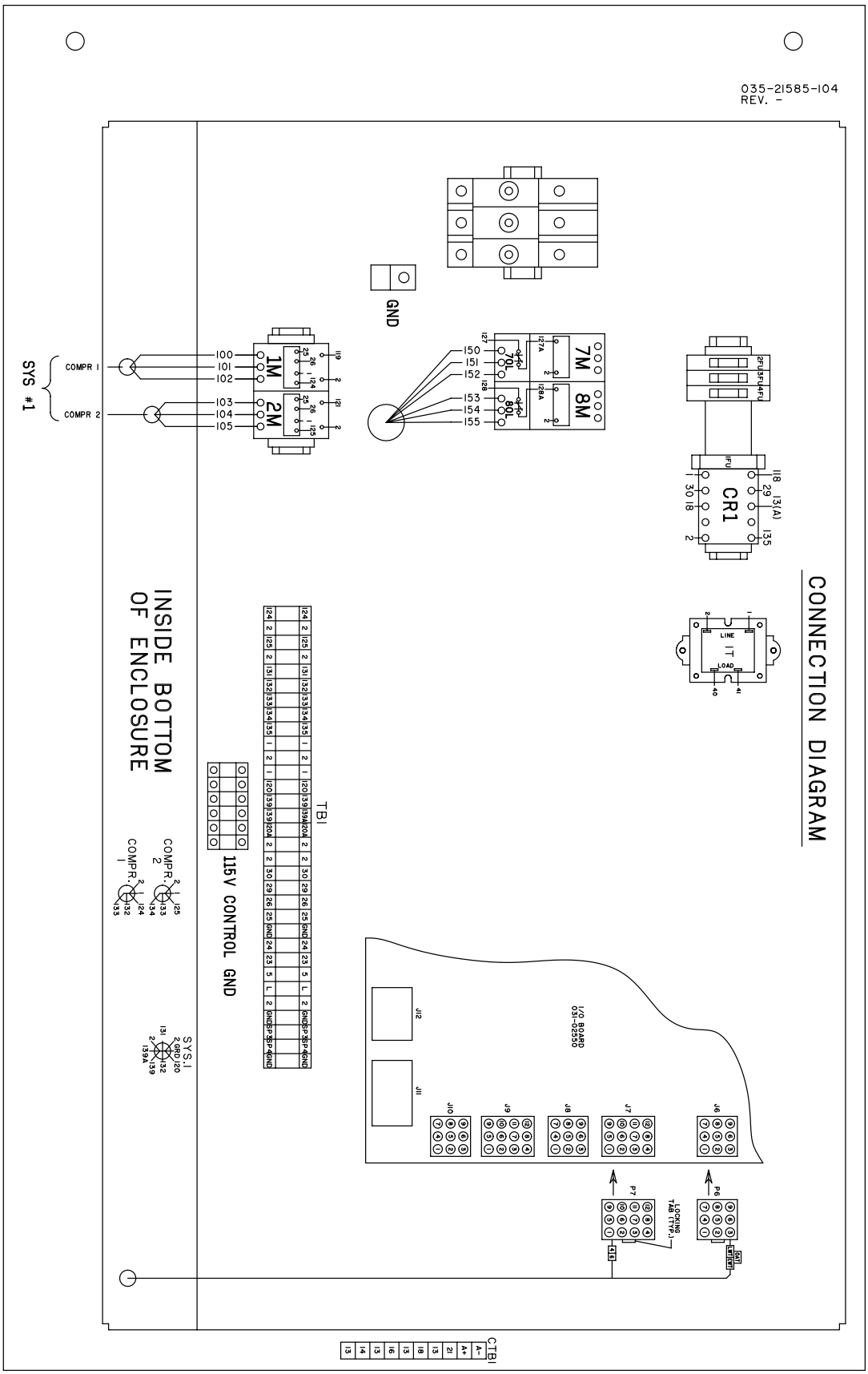
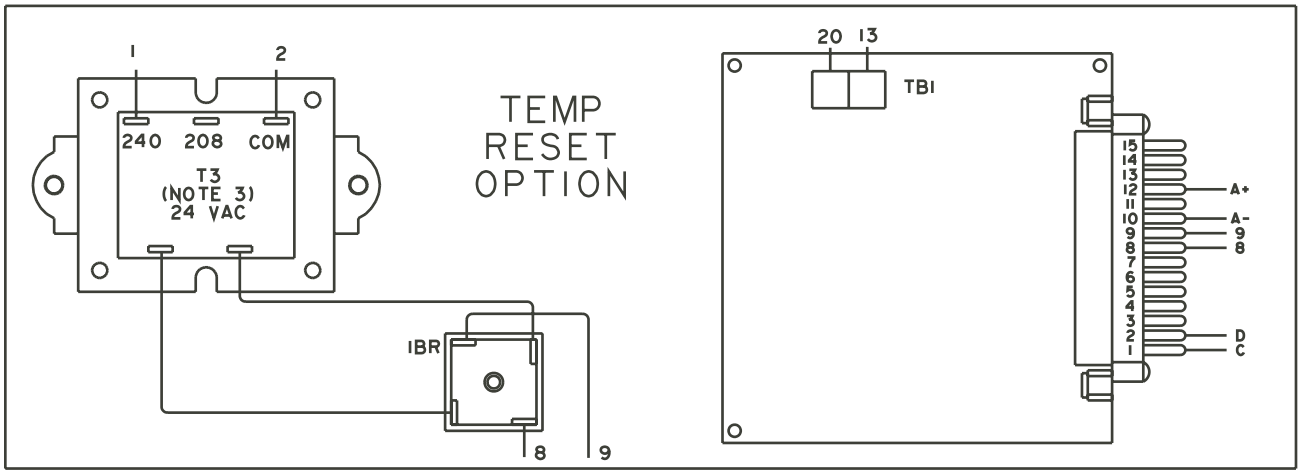
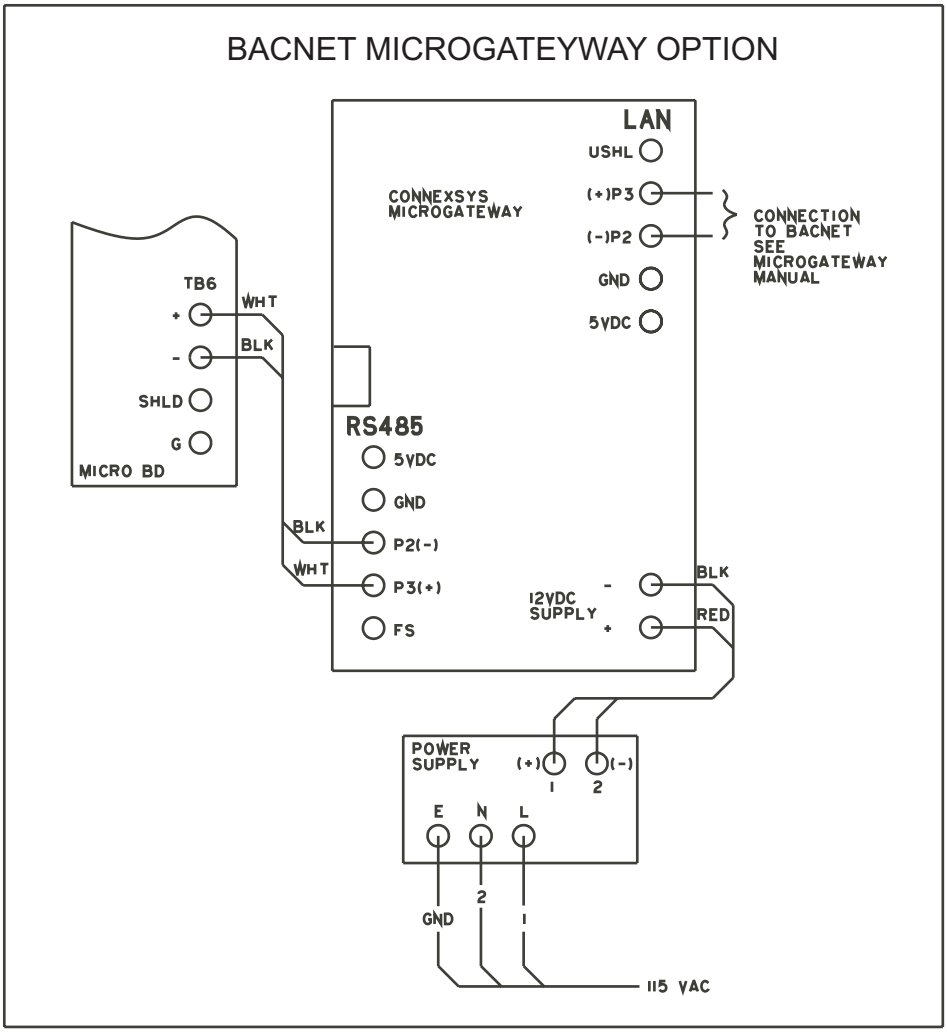


FIG. 10 – CONNECTION DIAGRAM

CONNECTION DIAGRAM
ALL MODELS

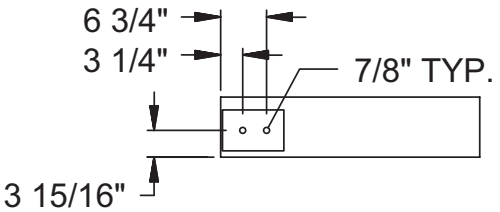




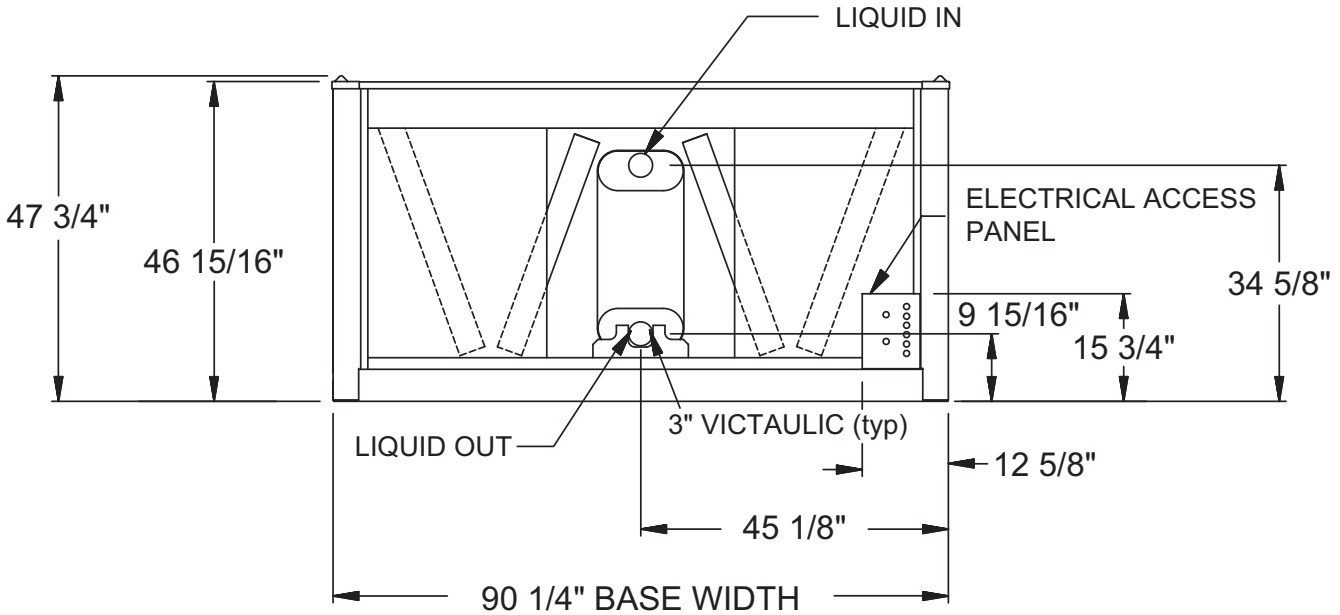
LD10960A

FIG. 11 – CONNECTION DIAGRAM MICROBOARD (PARTIAL)

DIMENSIONS - YCAL0041 (ENGLISH)



VIEW B-B
BOTTOM OF PANEL



LEFT END

Aluminum		
YCAL	Center of Gravity (in.)	
	X	Y
0041	59.6	43.6

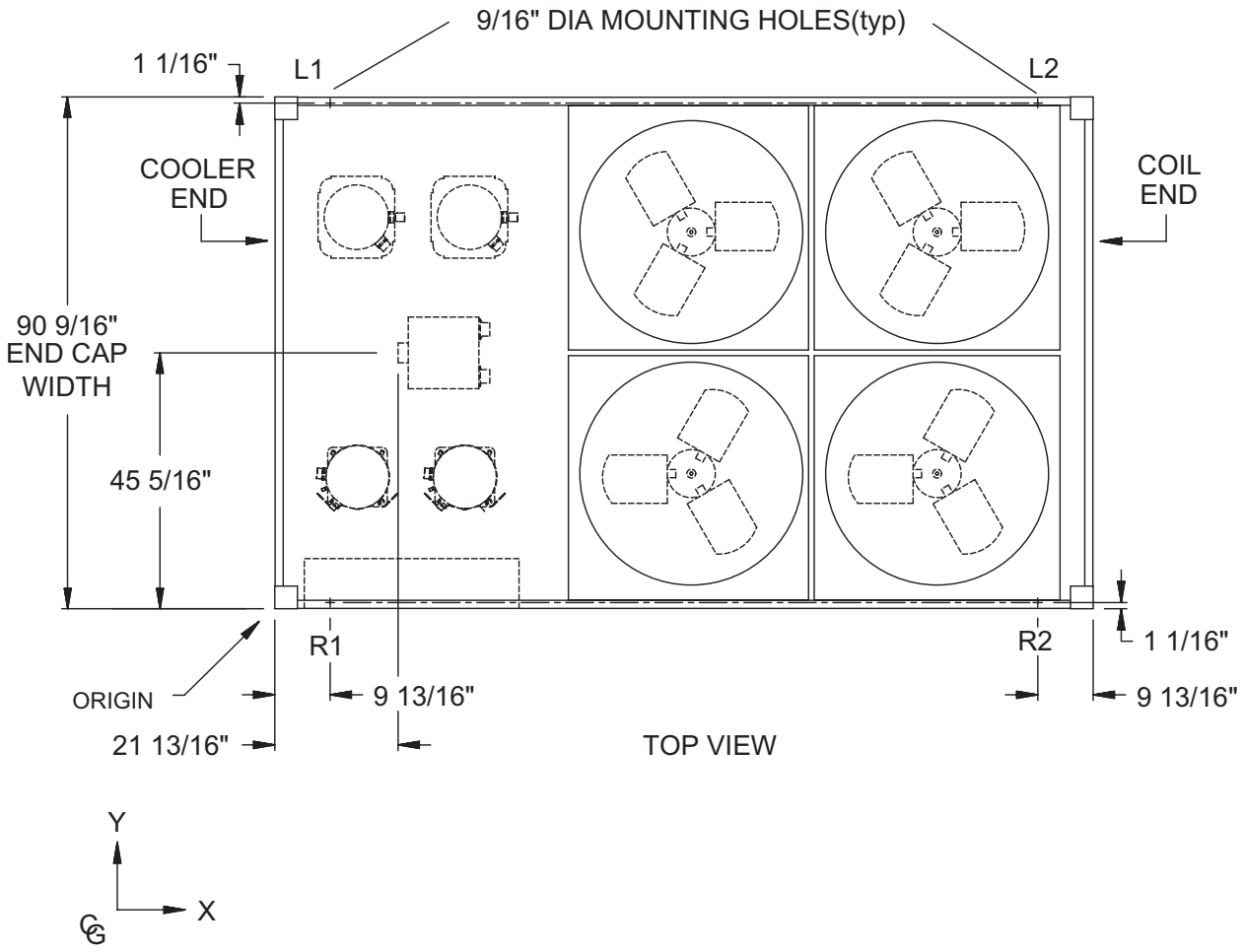
Copper		
YCAL	Center of Gravity (in.)	
	X	Y
0041	63.6	43.7

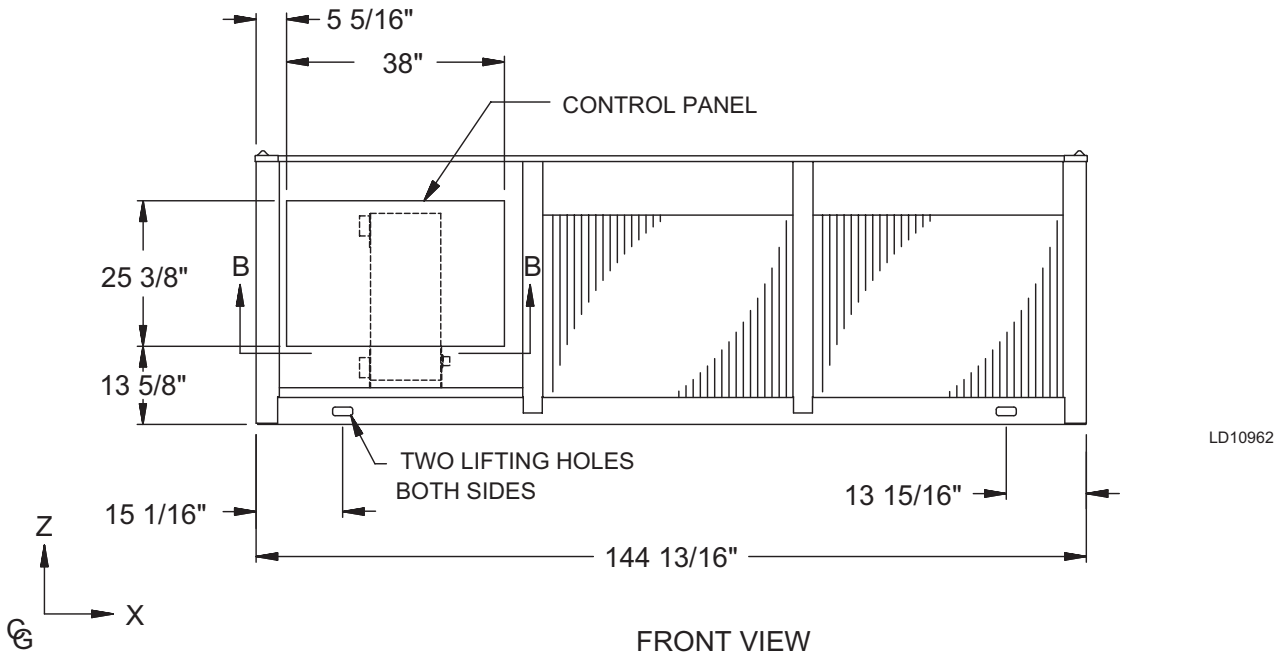
LD10962

NOTE:

Placement on a level surface of free of obstructions (including snow, for winter operation) or air circulation ensures rated performance, reliable operation, and ease of maintenance. Site restrictions may compromise minimum clearances indicated below, resulting in unpredictable airflow patterns and possible diminished performance. YORK's unit controls will optimize operation without nuisance high-pressure safety cutouts; however, the system designer must consider potential performance degradation. Recommended minimum clearances: front to wall – 6'; rear to wall – 6'; cooler end to wall – 4'0"; coil end to wall - 6'; top – no obstructions allowed; distance between adjacent units – 10'. No more than one adjacent wall may be higher than the unit. 1" nominal deflection isolators (not shown) will increase overall unit height by 6".

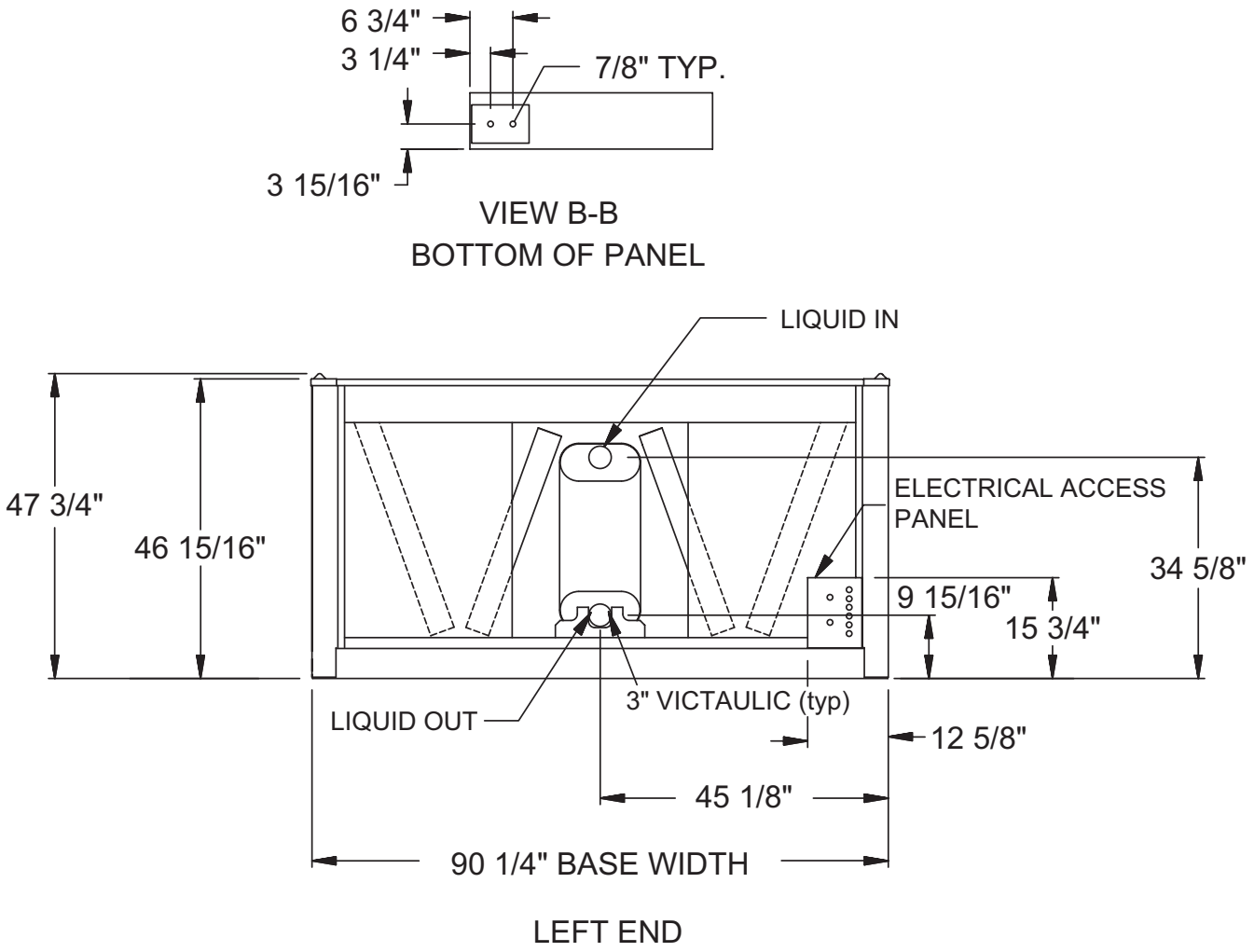
DIMENSIONS - YCAL0041 (ENGLISH) (CON'T)





6

DIMENSIONS - YCAL0045 (ENGLISH)



Aluminum		
YCAL	Center of Gravity (in.)	
	X	Y
0045	59.2	43.5

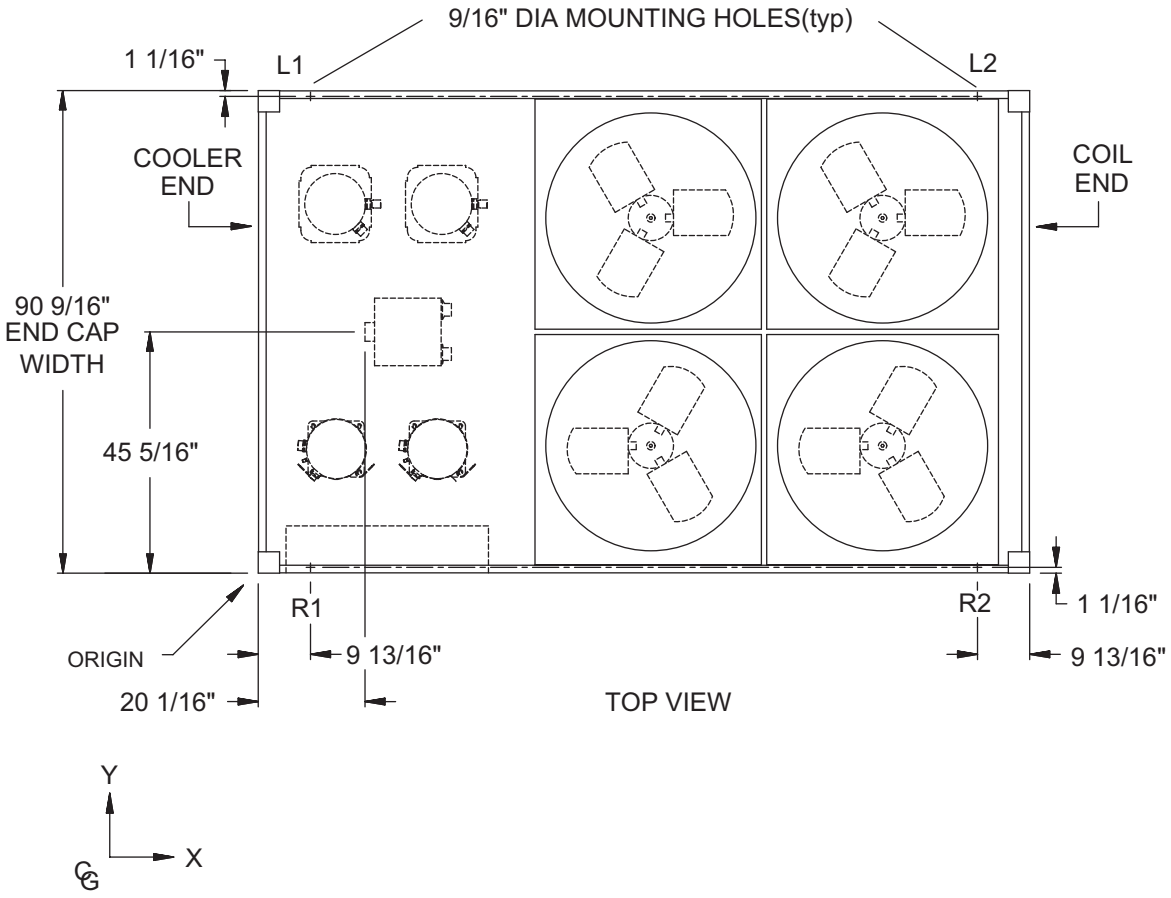
Copper		
YCAL	Center of Gravity (in.)	
	X	Y
0045	63.2	43.7

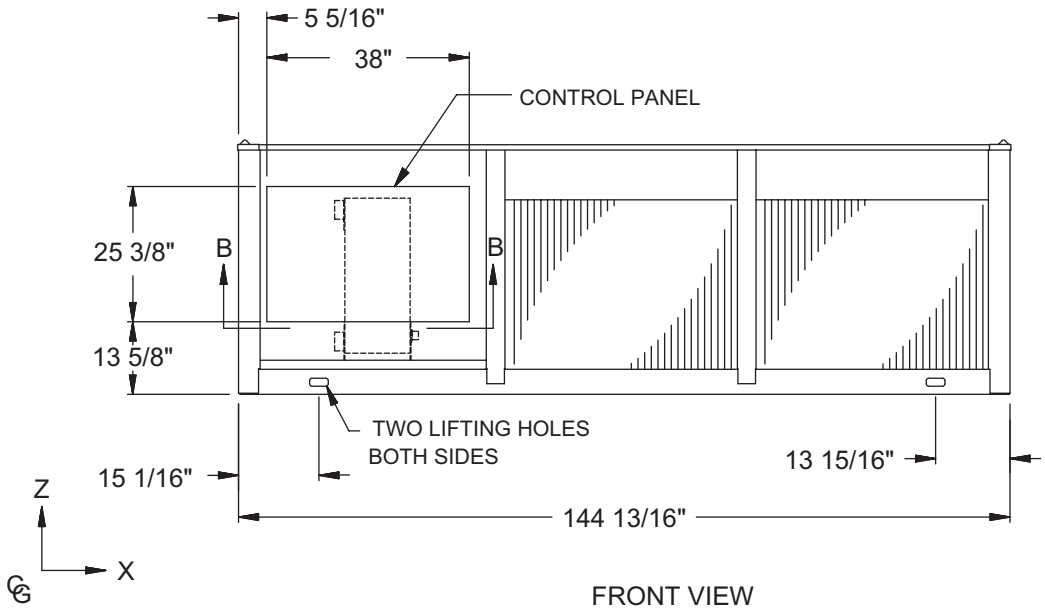
LD10963

NOTE:

Placement on a level surface of free of obstructions (including snow, for winter operation) or air circulation ensures rated performance, reliable operation, and ease of maintenance. Site restrictions may compromise minimum clearances indicated below, resulting in unpredictable airflow patterns and possible diminished performance. YORK's unit controls will optimize operation without nuisance high-pressure safety cutouts; however, the system designer must consider potential performance degradation. Recommended minimum clearances: front to wall – 6'; rear to wall – 6'; cooler end to wall – 4'0"; coil end to wall - 6'; top – no obstructions allowed; distance between adjacent units – 10'. No more than one adjacent wall may be higher than the unit. 1" nominal deflection isolators (not shown) will increase overall unit height by 6".

DIMENSIONS - YCAL0045 (ENGLISH) (CON'T)

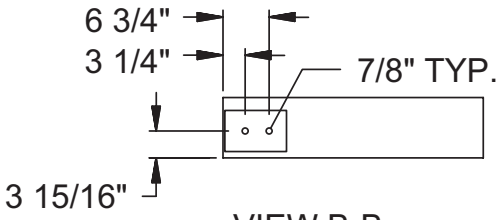




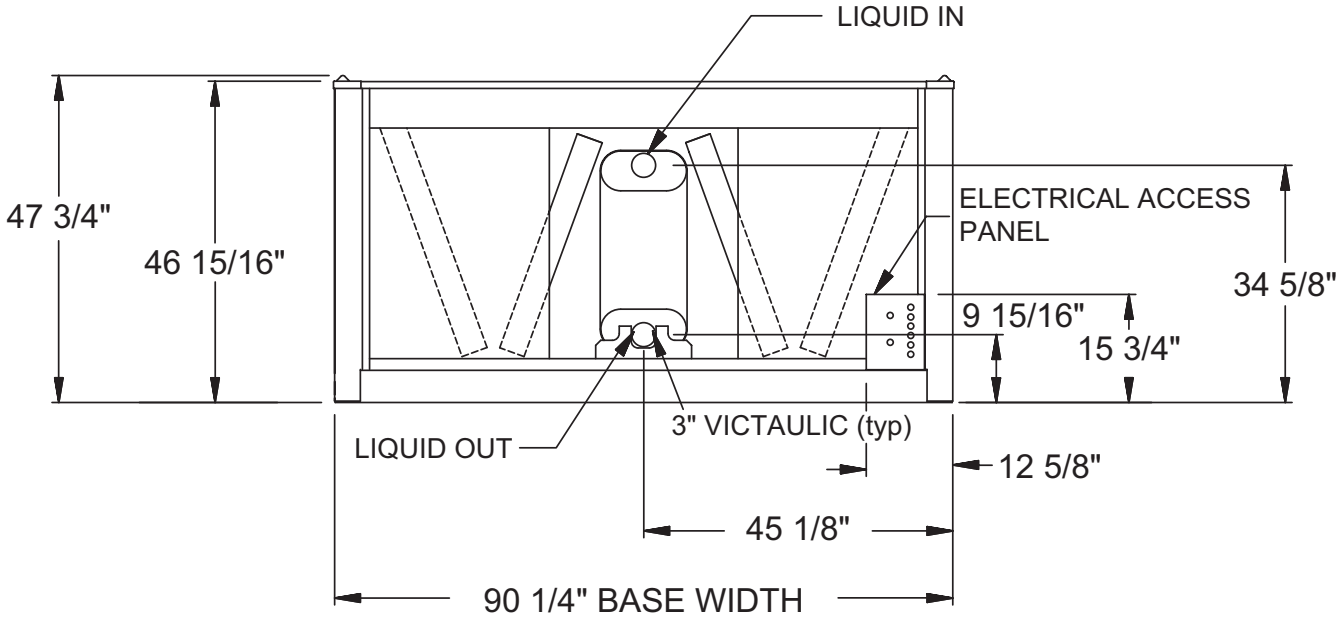
LD10964

6

DIMENSIONS - YCAL0051 (ENGLISH)



VIEW B-B
BOTTOM OF PANEL



LEFT END

Aluminum		
YCAL	Center of Gravity (in.)	
	X	Y
0051	59.2	42.6

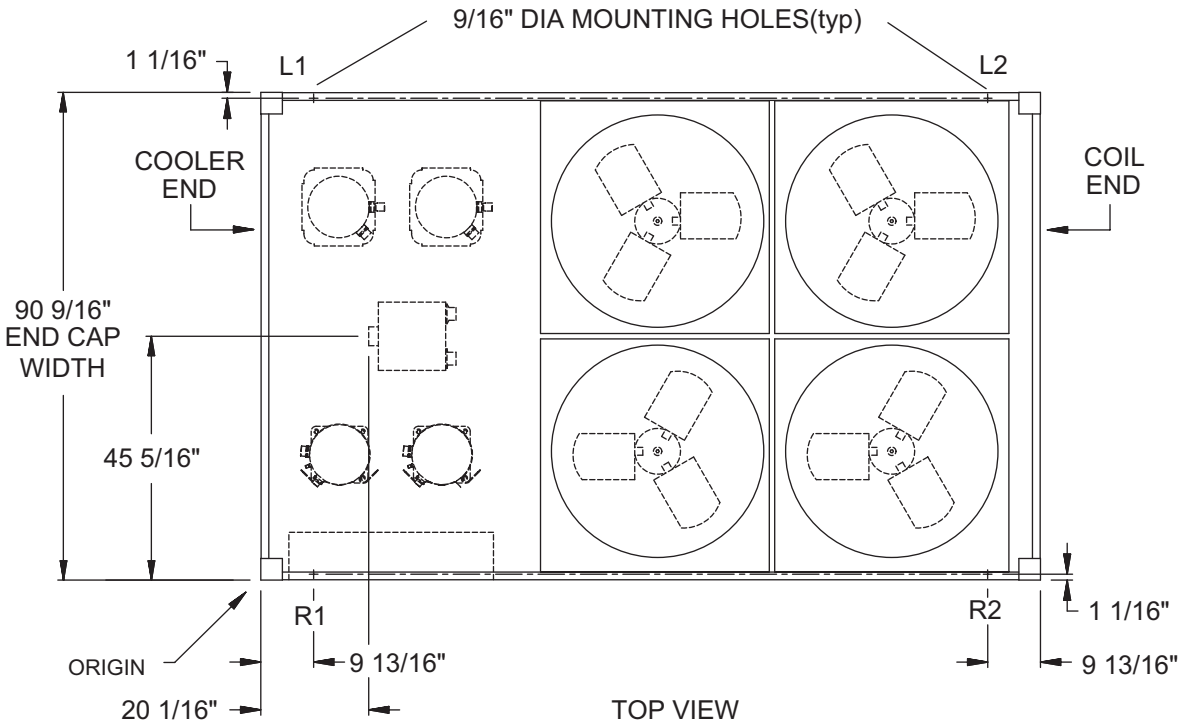
Copper		
YCAL	Center of Gravity (in.)	
	X	Y
0051	64.3	42.9

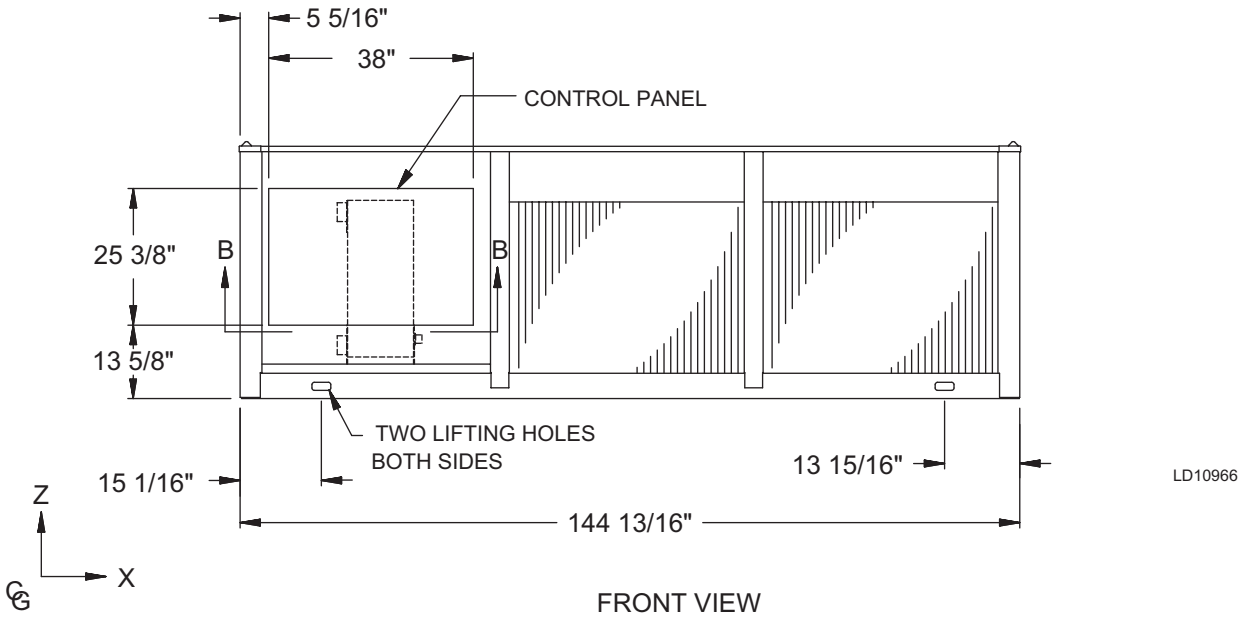
LD10965

NOTE:

Placement on a level surface of free of obstructions (including snow, for winter operation) or air circulation ensures rated performance, reliable operation, and ease of maintenance. Site restrictions may compromise minimum clearances indicated below, resulting in unpredictable airflow patterns and possible diminished performance. YORK's unit controls will optimize operation without nuisance high-pressure safety cutouts; however, the system designer must consider potential performance degradation. Recommended minimum clearances: front to wall – 6'; rear to wall – 6'; cooler end to wall – 4'0"; coil end to wall - 6'; top – no obstructions allowed; distance between adjacent units – 10'. No more than one adjacent wall may be higher than the unit. 1" nominal deflection isolators (not shown) will increase overall unit height by 6".

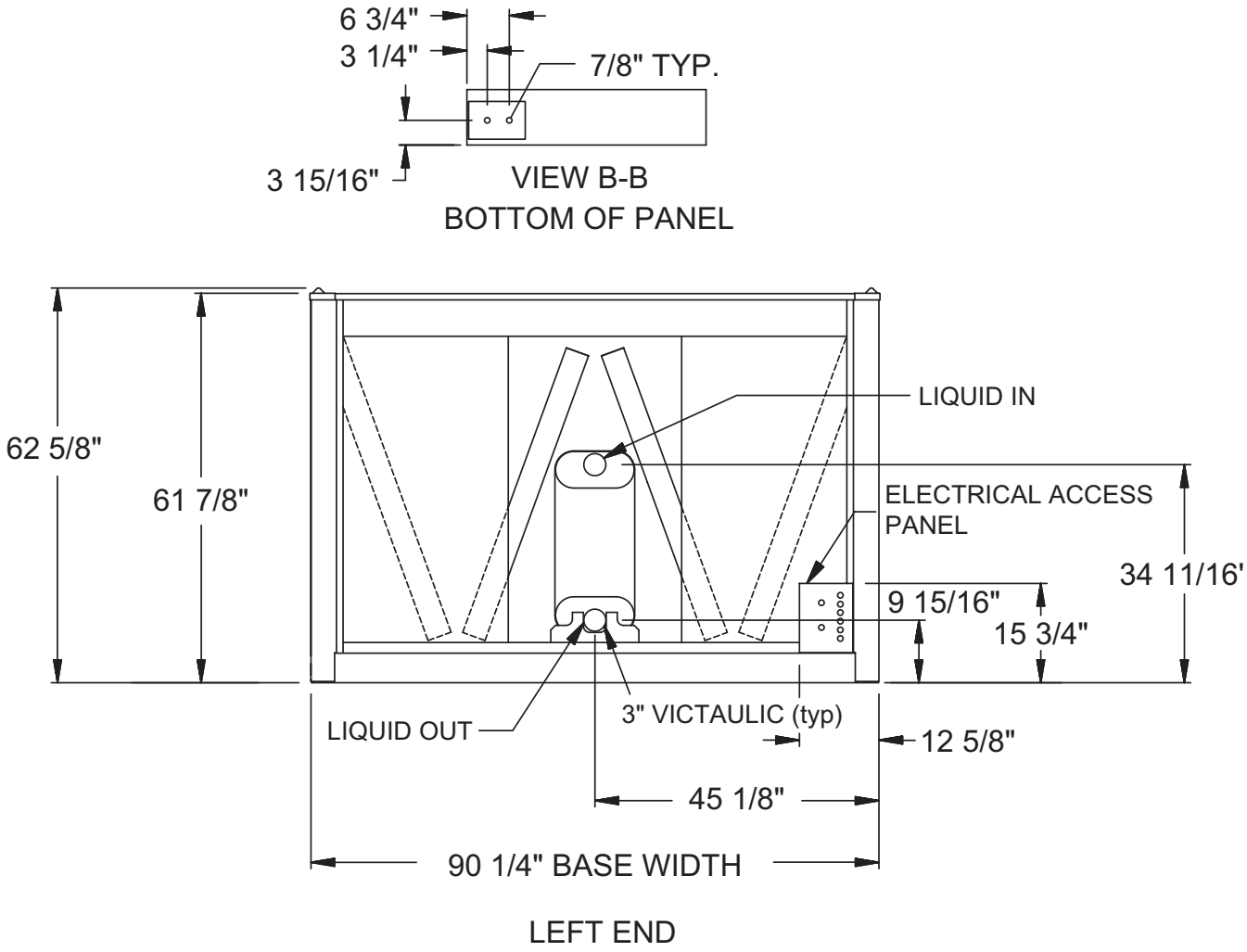
DIMENSIONS - YCAL0051 (ENGLISH) (CON'T)





6

DIMENSIONS - YCAL0055 (ENGLISH)



Aluminum		
YCAL	Center of Gravity (in.)	
	X	Y
0055	57.9	43.0

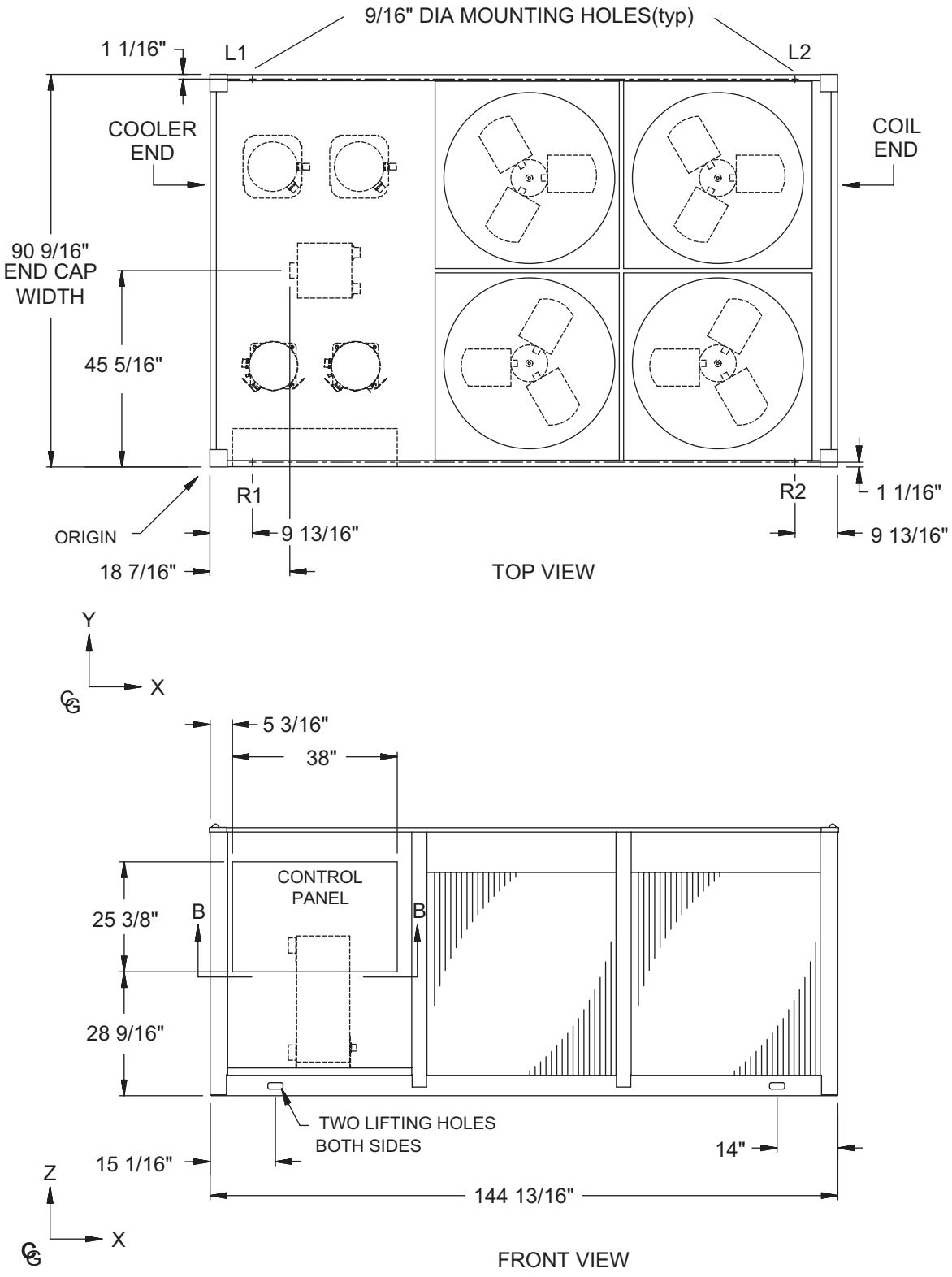
Copper		
YCAL	Center of Gravity (in.)	
	X	Y
0055	62.5	43.2

LD10967

NOTE:

Placement on a level surface of free of obstructions (including snow, for winter operation) or air circulation ensures rated performance, reliable operation, and ease of maintenance. Site restrictions may compromise minimum clearances indicated below, resulting in unpredictable airflow patterns and possible diminished performance. YORK's unit controls will optimize operation without nuisance high-pressure safety cutouts; however, the system designer must consider potential performance degradation. Recommended minimum clearances: front to wall – 6'; rear to wall – 6'; cooler end to wall – 4'0"; coil end to wall - 6'; top – no obstructions allowed; distance between adjacent units – 10'. No more than one adjacent wall may be higher than the unit. 1" nominal deflection isolators (not shown) will increase overall unit height by 6".

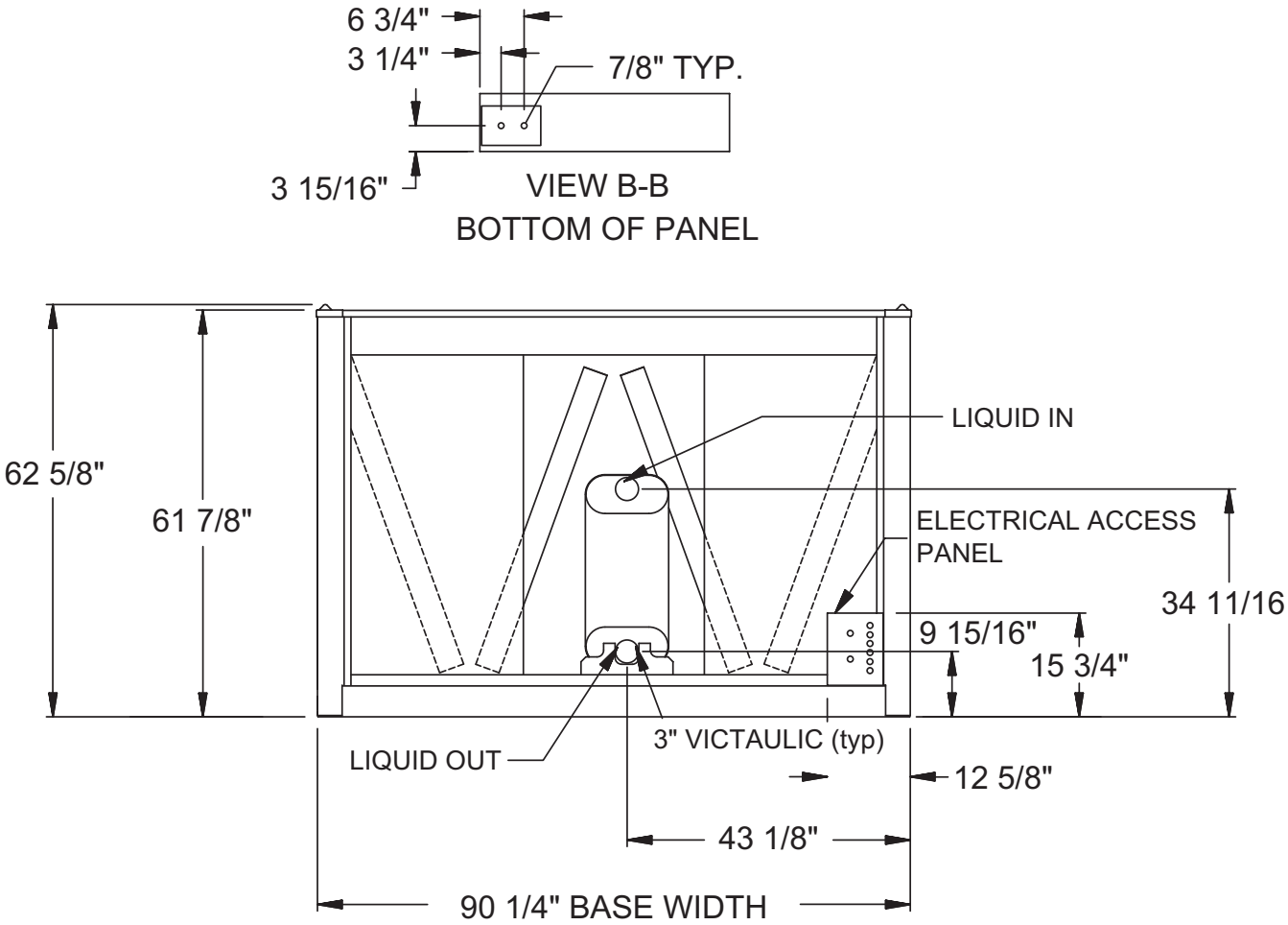
DIMENSIONS - YCAL0055 (ENGLISH) (CON'T)



LD10968

6

DIMENSIONS - YCAL0061 (ENGLISH)



Aluminum		
YCAL	Center of Gravity (in.)	
	X	Y
0061	56.6	45.2

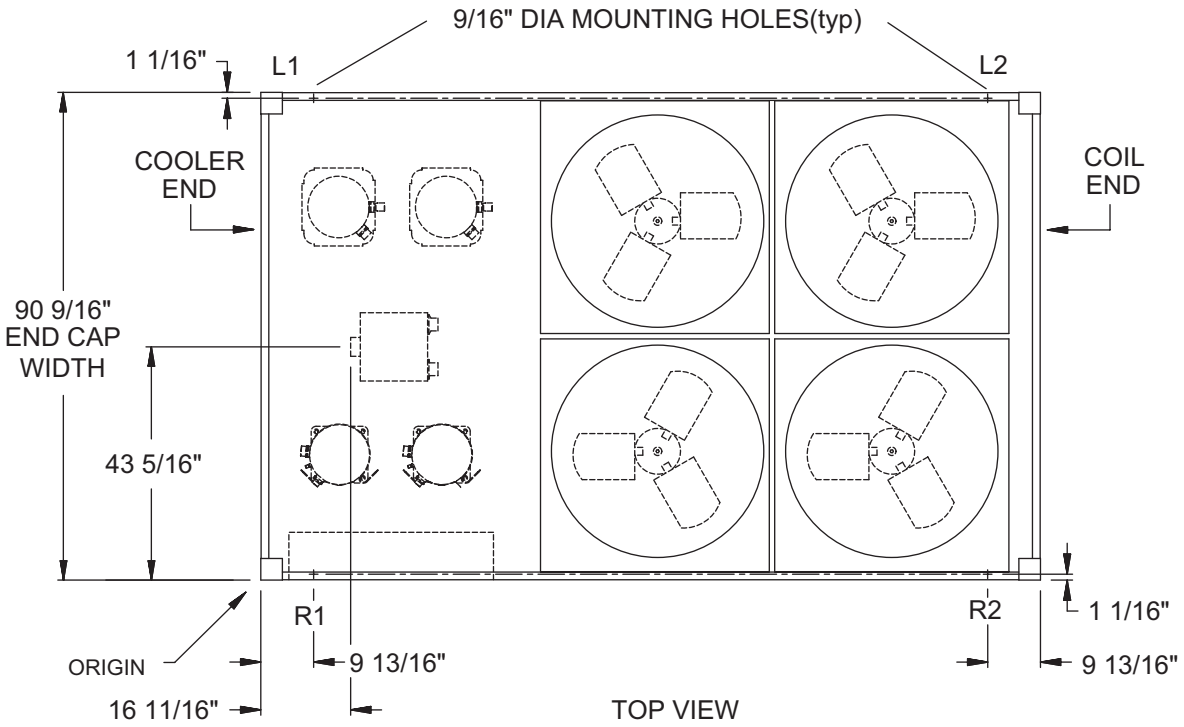
Copper		
YCAL	Center of Gravity (in.)	
	X	Y
0061	61.8	45.8

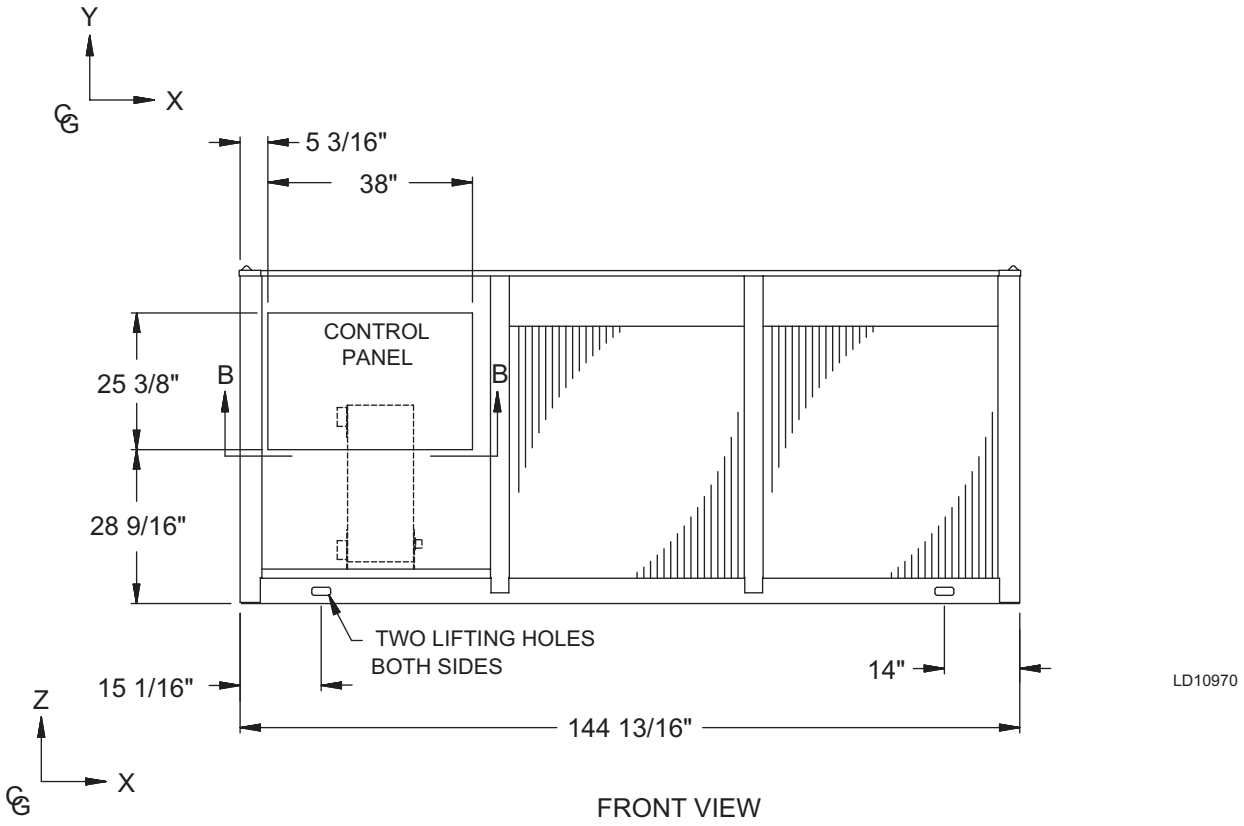
LD10969

NOTE:

Placement on a level surface of free of obstructions (including snow, for winter operation) or air circulation ensures rated performance, reliable operation, and ease of maintenance. Site restrictions may compromise minimum clearances indicated below, resulting in unpredictable airflow patterns and possible diminished performance. YORK's unit controls will optimize operation without nuisance high-pressure safety cutouts; however, the system designer must consider potential performance degradation. Recommended minimum clearances: front to wall – 6'; rear to wall – 6'; cooler end to wall – 4'0"; coil end to wall - 6'; top – no obstructions allowed; distance between adjacent units – 10'. No more than one adjacent wall may be higher than the unit. 1" nominal deflection isolators (not shown) will increase overall unit height by 6".

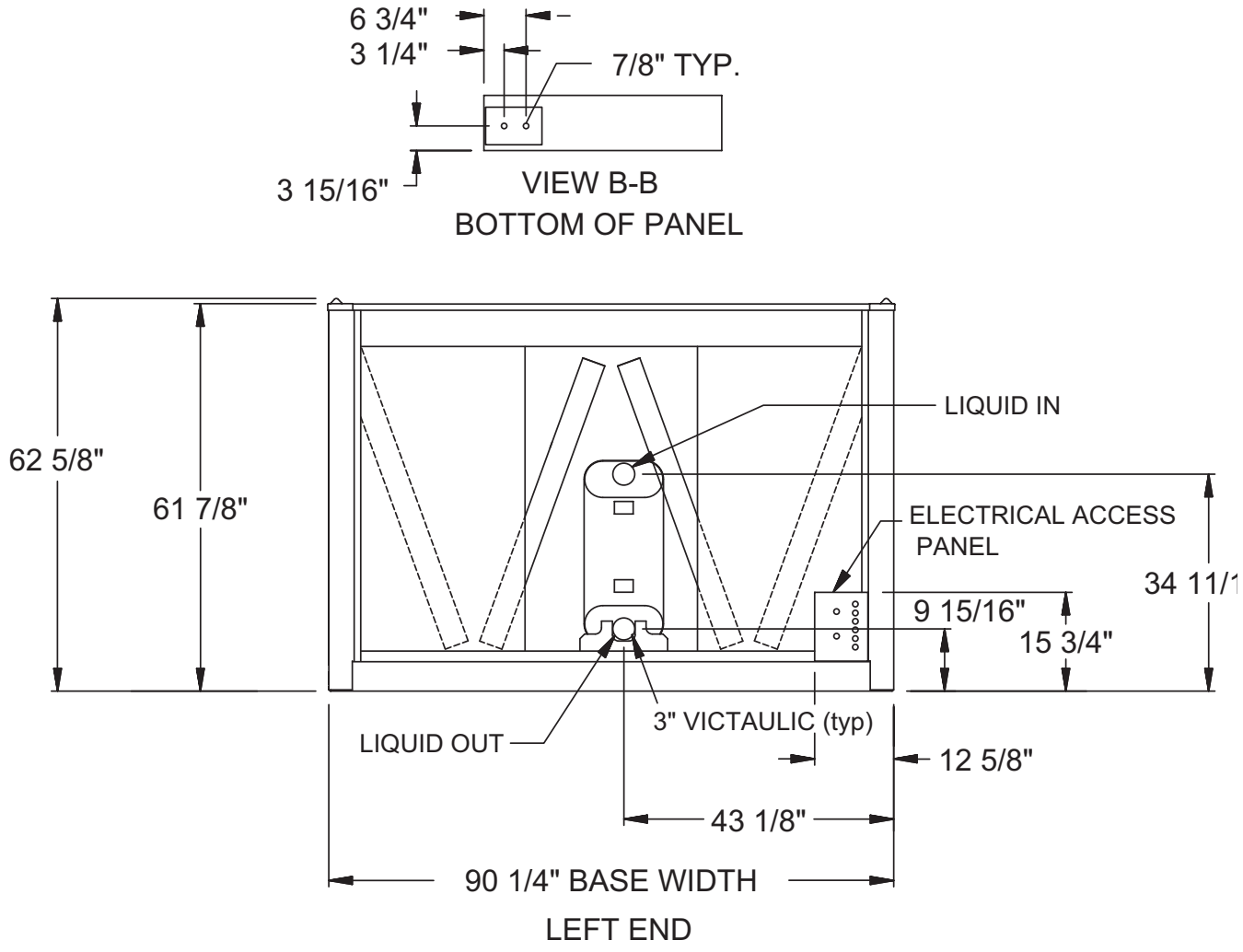
DIMENSIONS - YCAL0061 (ENGLISH) (CON'T)





6

DIMENSIONS - YCAL0065 (ENGLISH)



Aluminum		
YCAL	Center of Gravity (in.)	
	X	Y
0065	59.7	44.9

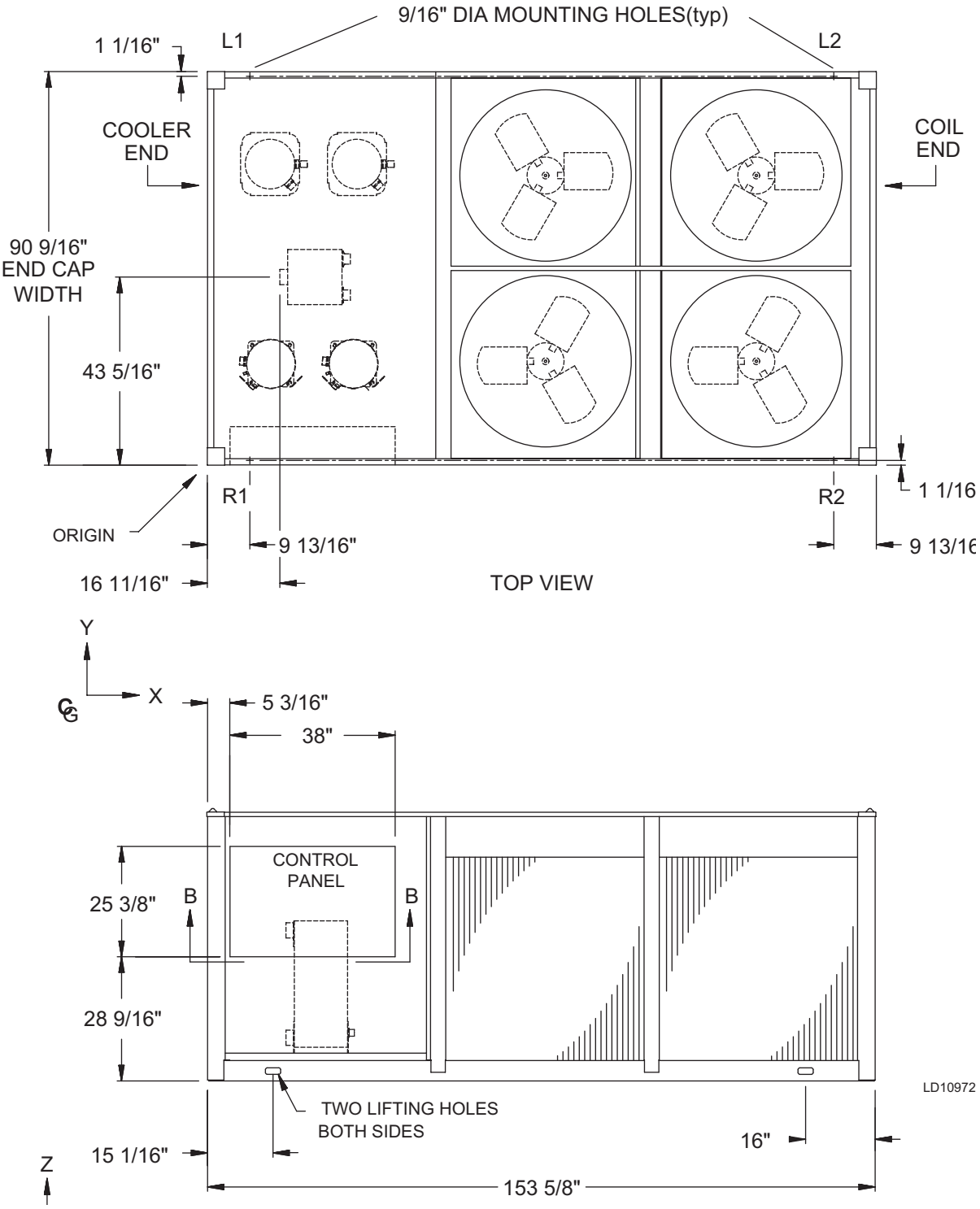
Copper		
YCAL	Center of Gravity (in.)	
	X	Y
0065	65.2	44.9

LD10971

NOTE:

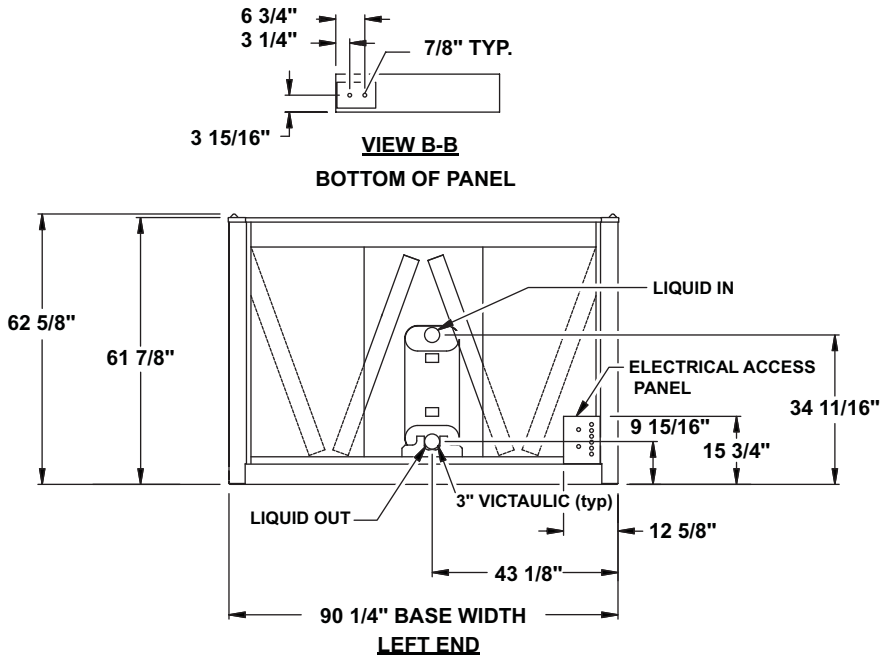
Placement on a level surface of free of obstructions (including snow, for winter operation) or air circulation ensures rated performance, reliable operation, and ease of maintenance. Site restrictions may compromise minimum clearances indicated below, resulting in unpredictable airflow patterns and possible diminished performance. YORK's unit controls will optimize operation without nuisance high-pressure safety cutouts; however, the system designer must consider potential performance degradation. Recommended minimum clearances: front to wall – 6'; rear to wall – 6'; cooler end to wall – 4'0"; coil end to wall - 6'; top – no obstructions allowed; distance between adjacent units – 10'. No more than one adjacent wall may be higher than the unit. 1" nominal deflection isolators (not shown) will increase overall unit height by 6".

DIMENSIONS - YCAL0065 (ENGLISH) (CON'T)



6

DIMENSIONS - YCAL0071 (ENGLISH)

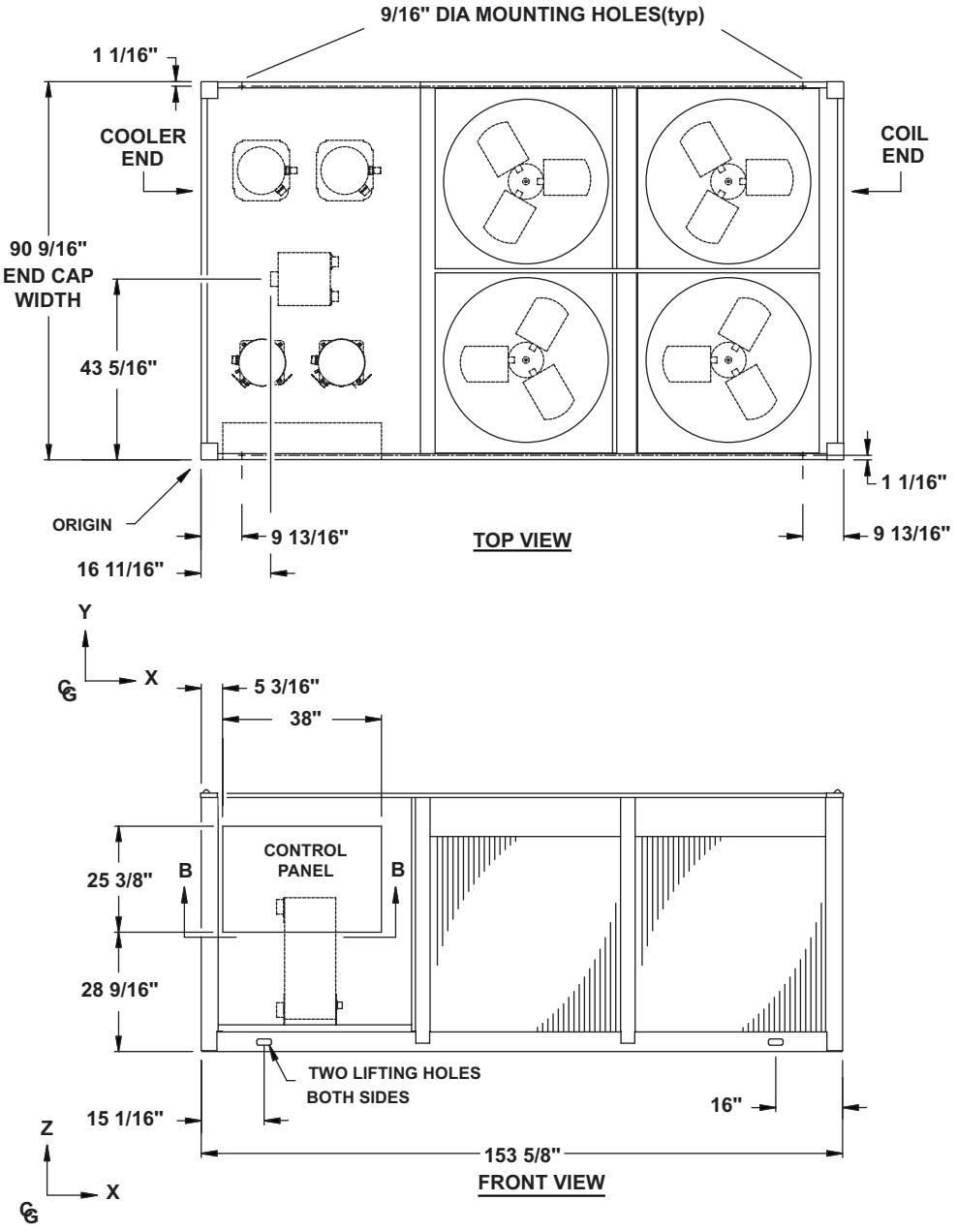


LD13251

NOTE:

Placement on a level surface of free of obstructions (including snow, for winter operation) or air circulation ensures rated performance, reliable operation, and ease of maintenance. Site restrictions may compromise minimum clearances indicated below, resulting in unpredictable airflow patterns and possible diminished performance. YORK's unit controls will optimize operation without nuisance high-pressure safety cutouts; however, the system designer must consider potential performance degradation. Recommended minimum clearances: front to wall – 6'; rear to wall – 6'; cooler end to wall – 4'0"; coil end to wall - 6'; top – no obstructions allowed; distance between adjacent units – 10'. No more than one adjacent wall may be higher than the unit. 1" nominal deflection isolators (not shown) will increase overall unit height by 6".

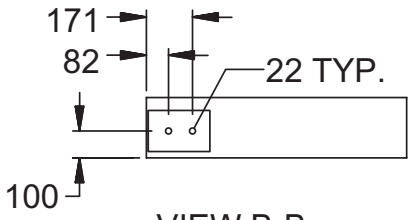
DIMENSIONS - YCAL0071 (ENGLISH) (CON'T)



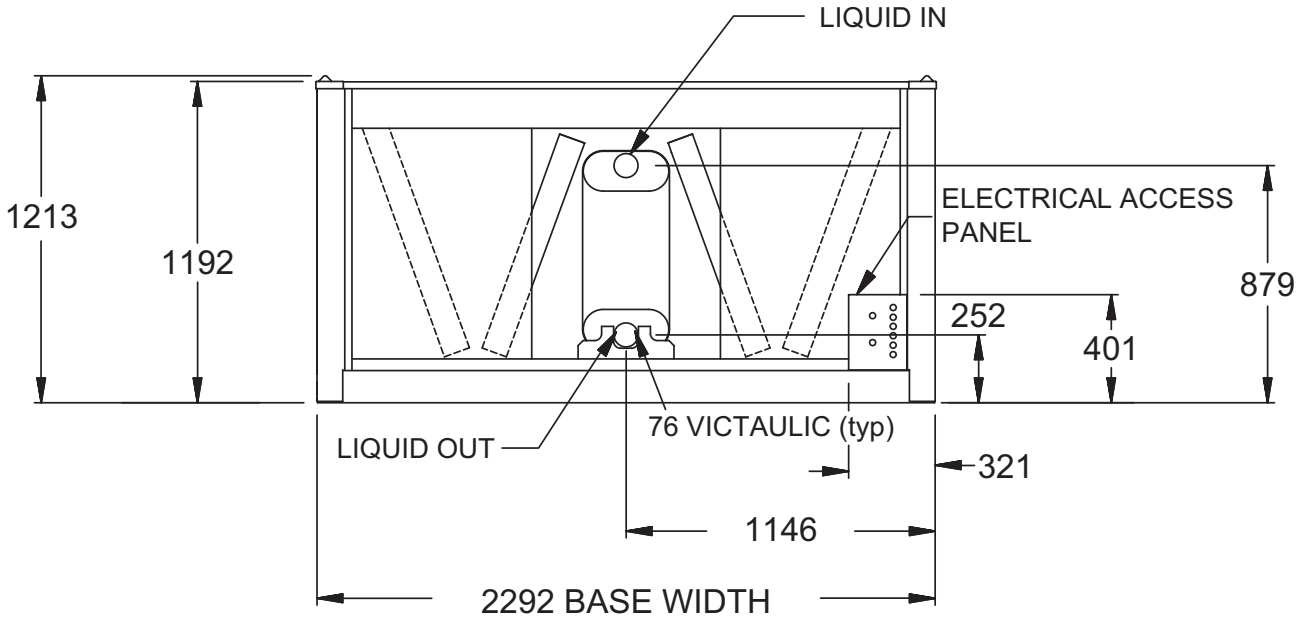
LD13252

6

DIMENSIONS - YCAL0041 (SI)



VIEW B-B
BOTTOM OF PANEL



LEFT END

Aluminum		
YCAL	Center of Gravity (in.)	
	X	Y
0041	1513.7	1107.0

Copper		
YCAL	Center of Gravity (in.)	
	X	Y
0041	1616.1	111.1

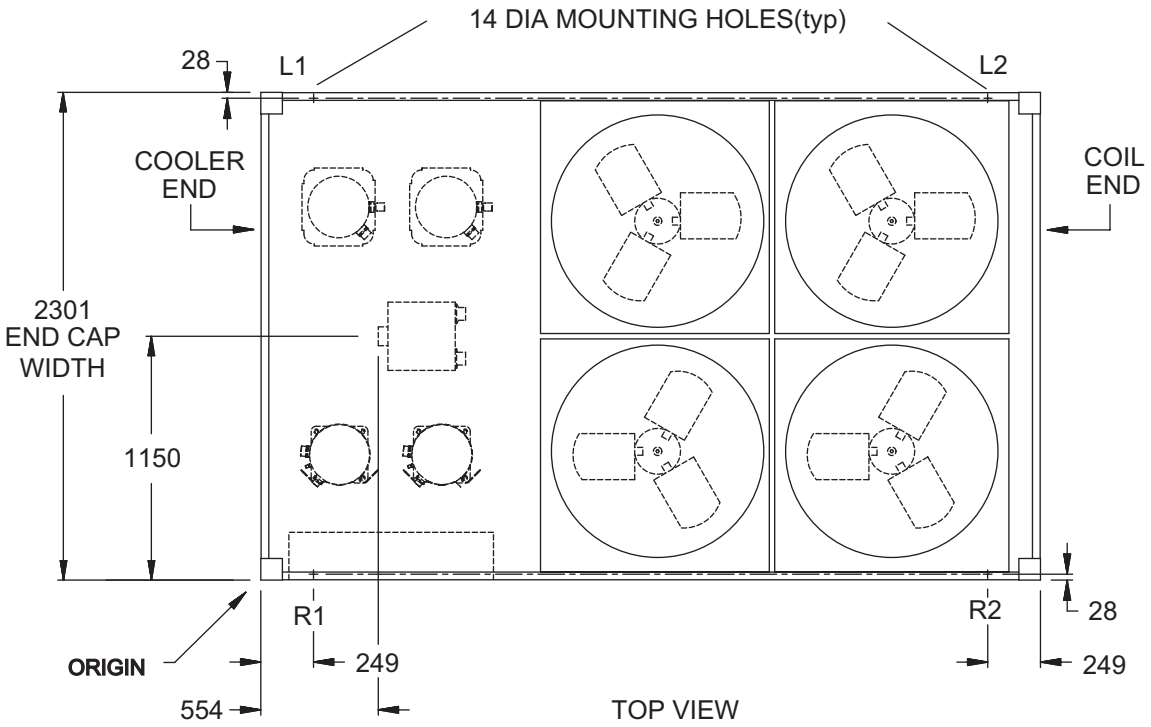
LD10973

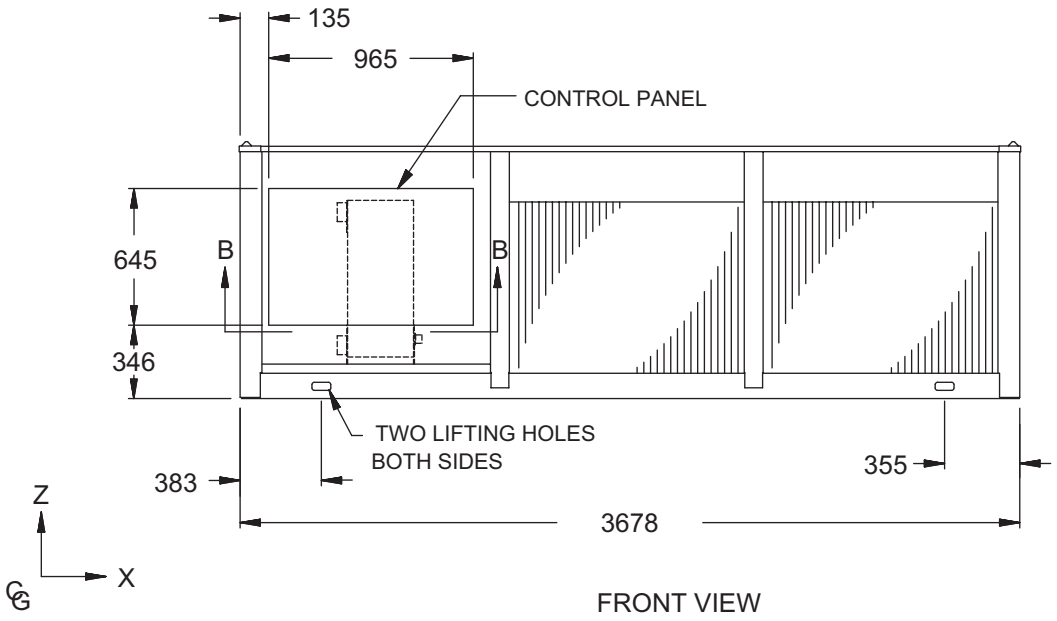
NOTE: *All dimensions are in mm unless specified otherwise.*

NOTE:

Placement on a level surface of free of obstructions (including snow, for winter operation) or air circulation ensures rated performance, reliable operation, and ease of maintenance. Site restrictions may compromise minimum clearances indicated below, resulting in unpredictable airflow patterns and possible diminished performance. YORK's unit controls will optimize operation without nuisance high-pressure safety cutouts; however, the system designer must consider potential performance degradation. Recommended minimum clearances: front to wall – 2m; rear to wall – 2m; cooler end to wall – 1.2m; coil end to wall - 2m; top – no obstructions allowed; distance between adjacent units – 3m. No more than one adjacent wall may be higher than the unit. 1" nominal deflection isolators (not shown) will increase overall unit height by 152mm.

DIMENSIONS - YCAL0041 (SI) (CON'T)

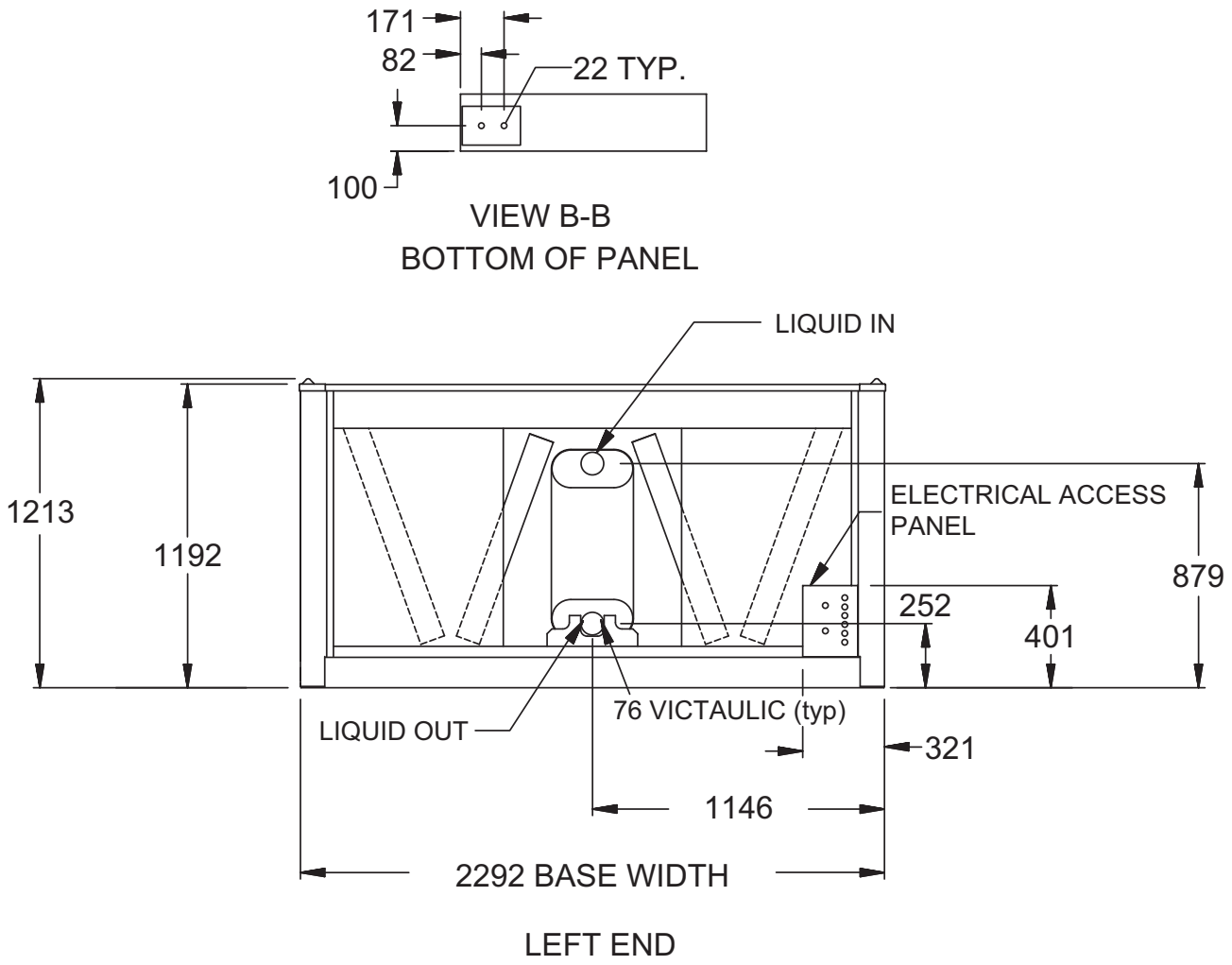




LD10974

6

DIMENSIONS - YCAL0045 (SI)



Aluminum		
YCAL	Center of Gravity (in.)	
	X	Y
0045	1503.5	1105.5

Copper		
YCAL	Center of Gravity (in.)	
	X	Y
0045	1605.9	1109.7

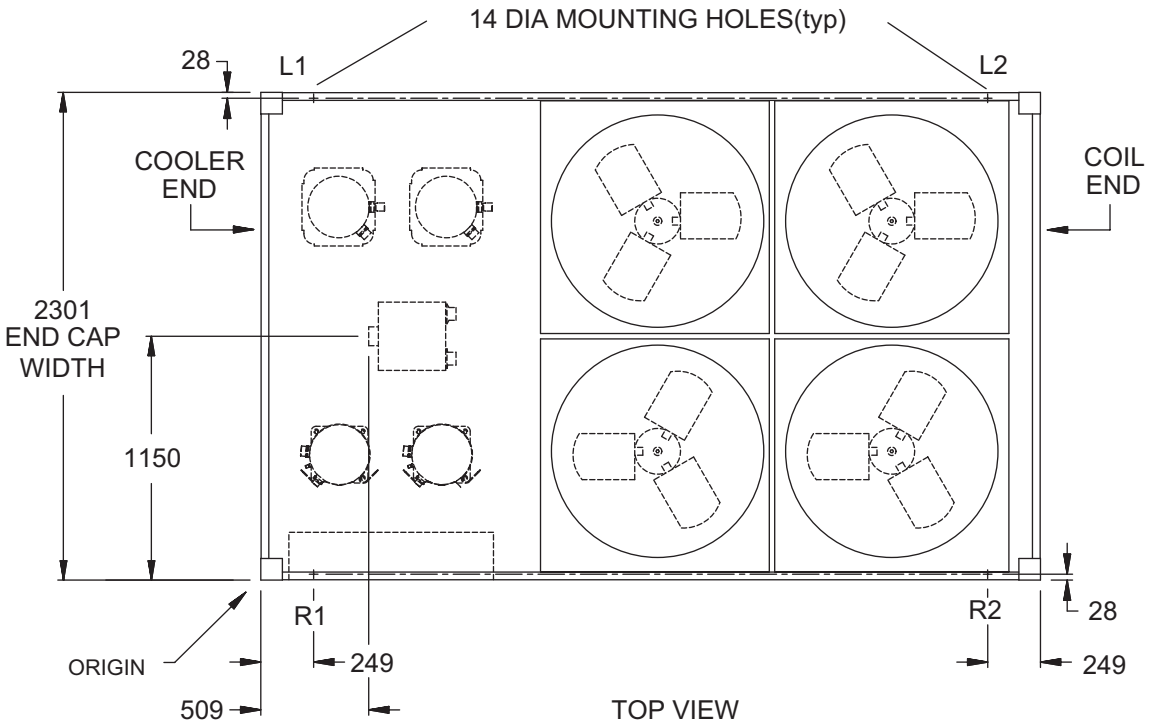
LD10975

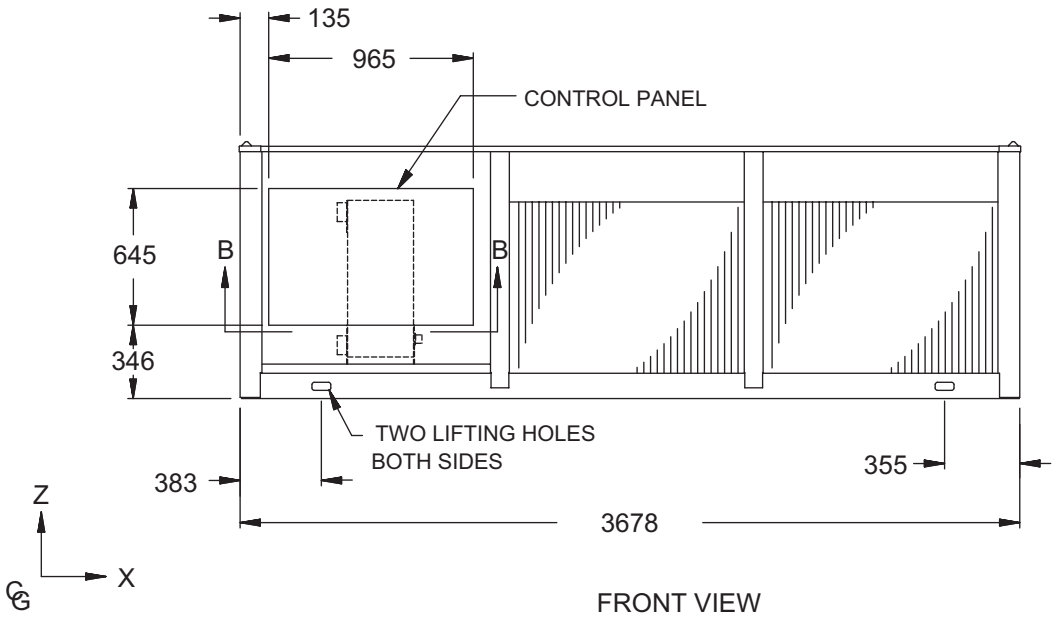
NOTE: *All dimensions are in mm unless specified otherwise.*

NOTE:

Placement on a level surface of free of obstructions (including snow, for winter operation) or air circulation ensures rated performance, reliable operation, and ease of maintenance. Site restrictions may compromise minimum clearances indicated below, resulting in unpredictable airflow patterns and possible diminished performance. YORK's unit controls will optimize operation without nuisance high-pressure safety cutouts; however, the system designer must consider potential performance degradation. Recommended minimum clearances: front to wall – 2m; rear to wall – 2m; cooler end to wall – 1.2m; coil end to wall - 2m; top – no obstructions allowed; distance between adjacent units – 3m. No more than one adjacent wall may be higher than the unit. 1" nominal deflection isolators (not shown) will increase overall unit height by 152mm.

DIMENSIONS - YCAL0045 (SI) (CON'T)

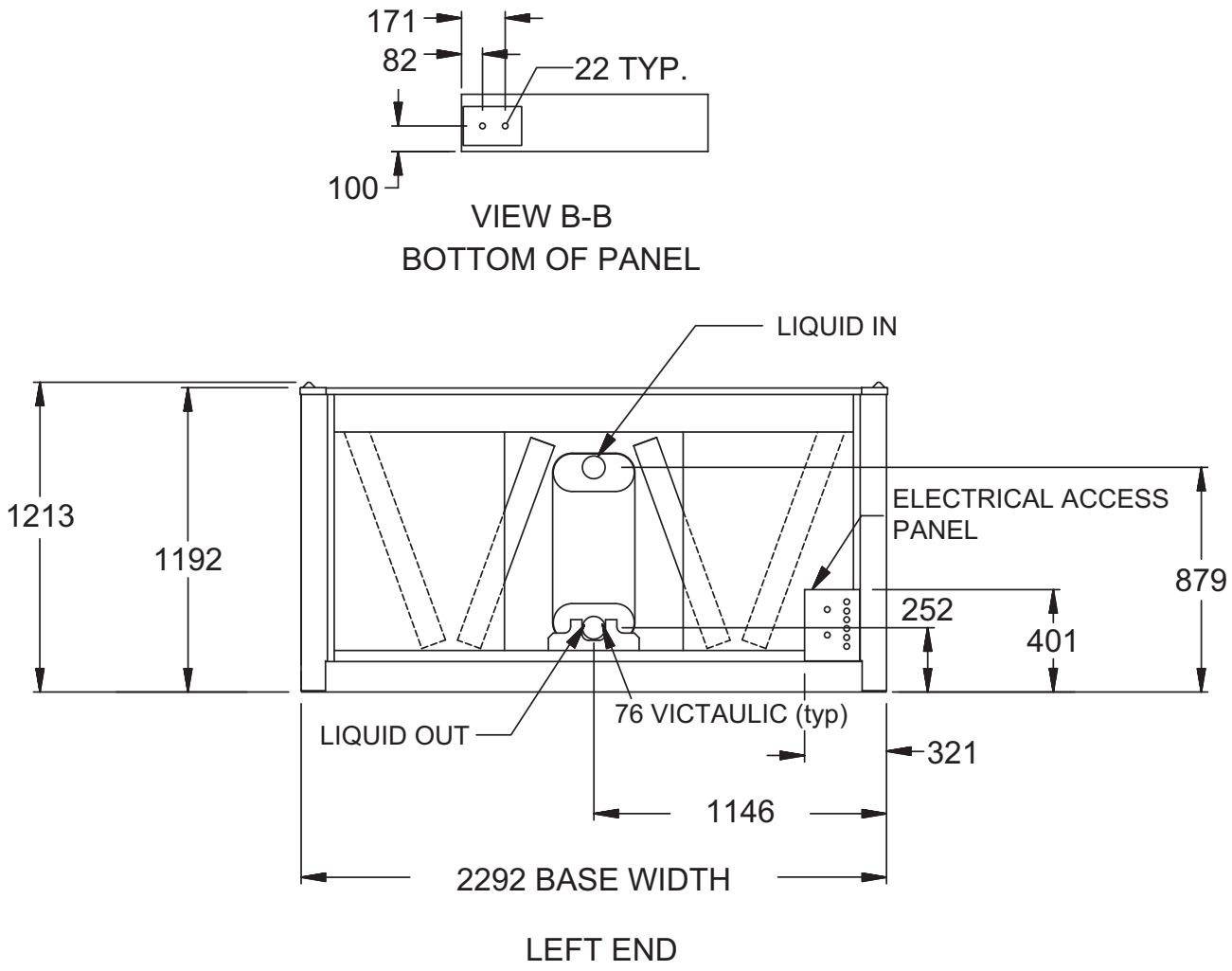




LD10976

6

DIMENSIONS - YCAL0051 (SI)



Aluminum		
YCAL	Center of Gravity (in.)	
	X	Y
0051	1504.6	1082.4

Copper		
YCAL	Center of Gravity (in.)	
	X	Y
0051	1633.0	1090.8

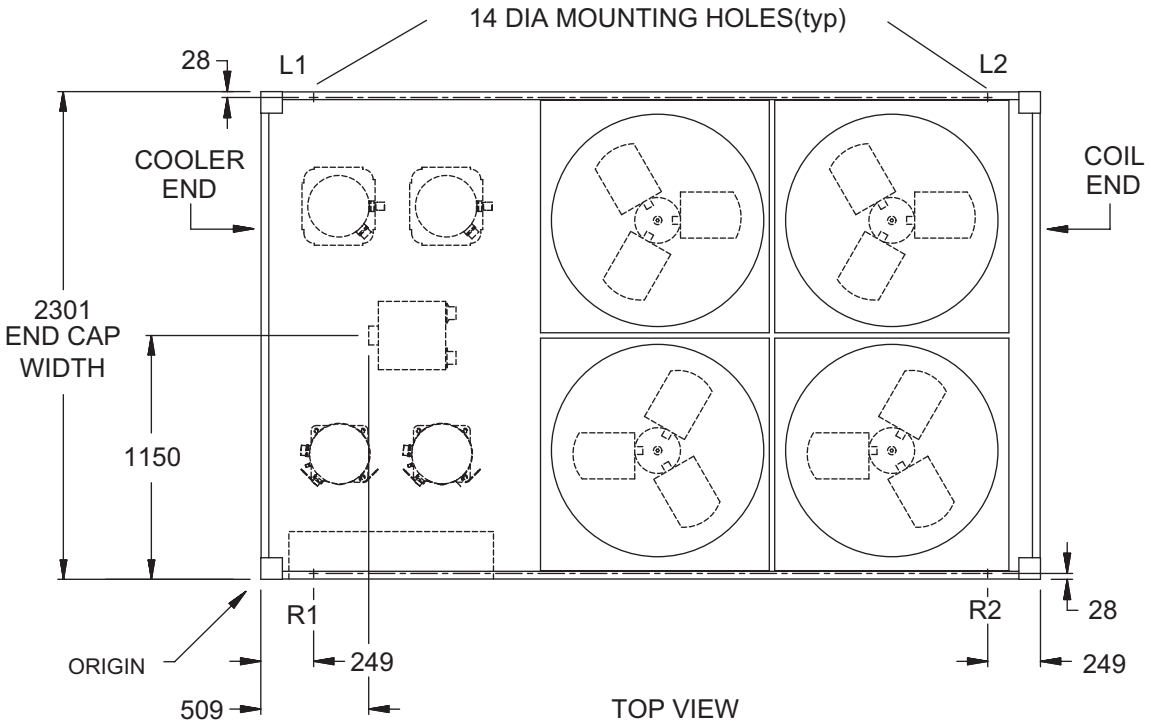
LD10977

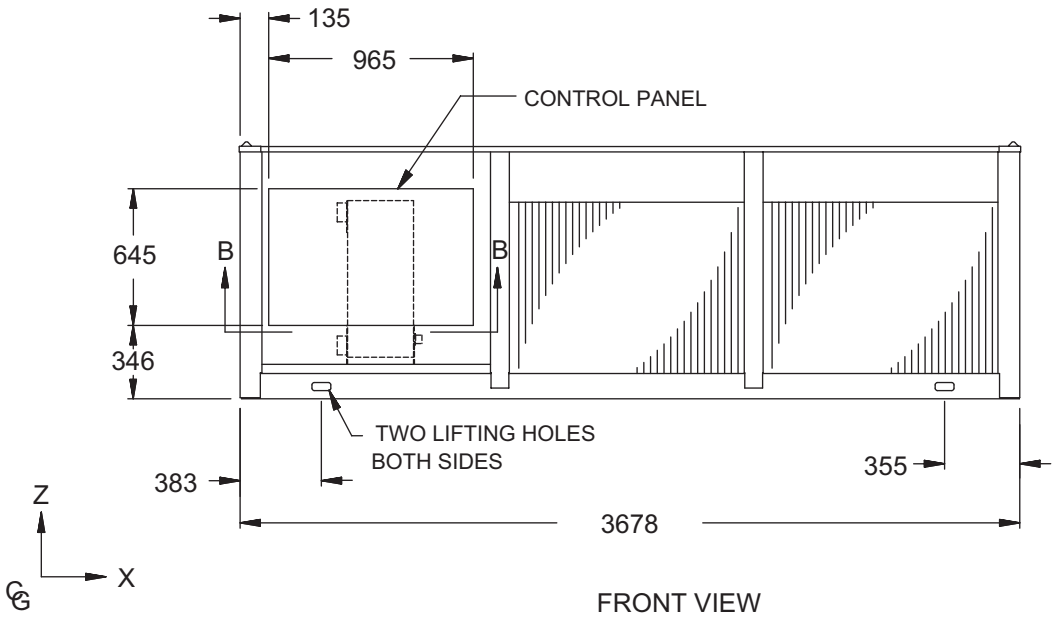
NOTE: *All dimensions are in mm unless specified otherwise.*

NOTE:

Placement on a level surface of free of obstructions (including snow, for winter operation) or air circulation ensures rated performance, reliable operation, and ease of maintenance. Site restrictions may compromise minimum clearances indicated below, resulting in unpredictable airflow patterns and possible diminished performance. YORK's unit controls will optimize operation without nuisance high-pressure safety cutouts; however, the system designer must consider potential performance degradation. Recommended minimum clearances: front to wall – 2m; rear to wall – 2m; cooler end to wall – 1.2m; coil end to wall - 2m; top – no obstructions allowed; distance between adjacent units – 3m. No more than one adjacent wall may be higher than the unit. 1" nominal deflection isolators (not shown) will increase overall unit height by 152mm.

DIMENSIONS - YCAL0051 (SI) (CON'T)

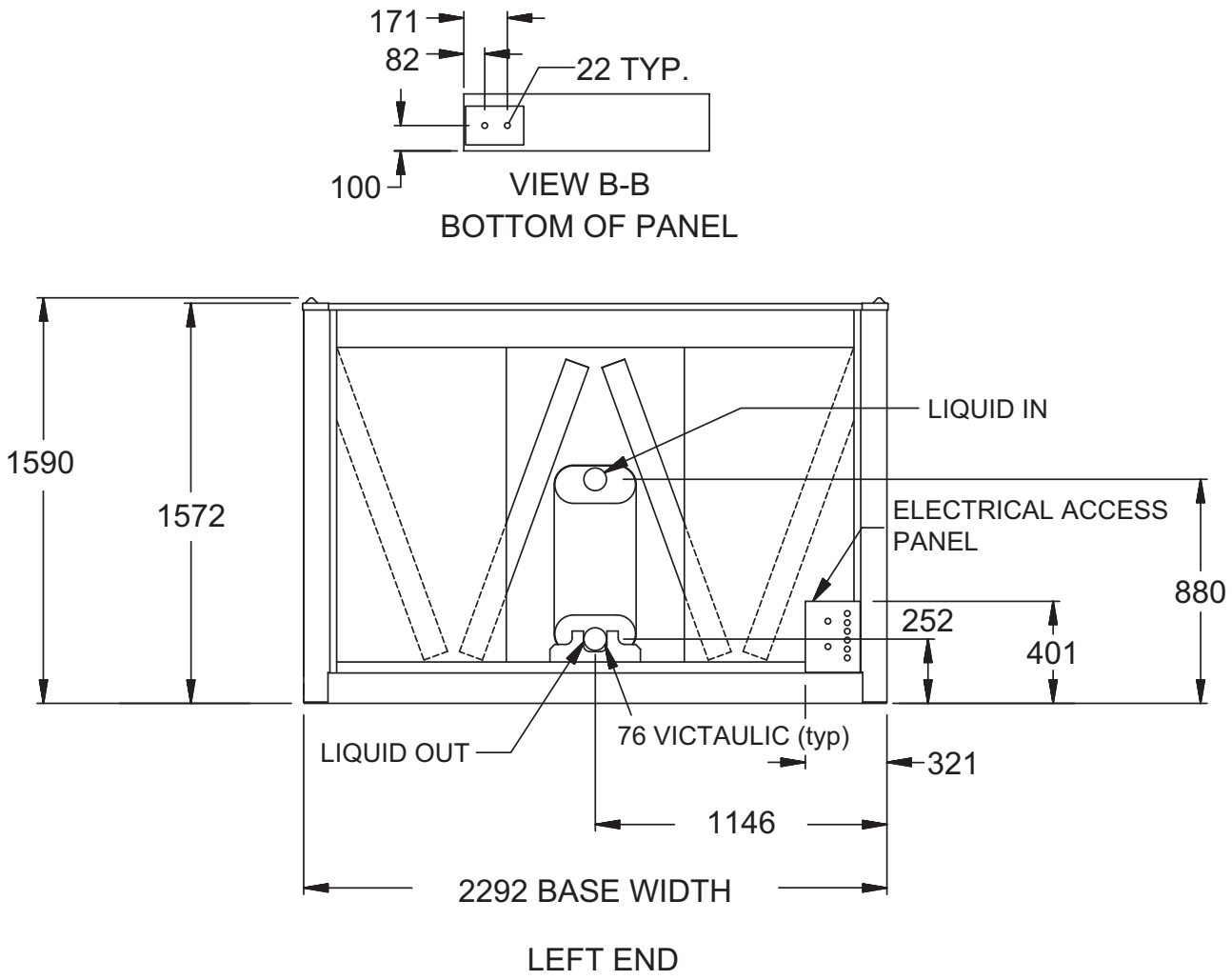




LD10978

6

DIMENSIONS - YCAL0055 (SI)



Aluminum		
YCAL	Center of Gravity (in.)	
	X	Y
0055	1470.3	1092.0

Copper		
YCAL	Center of Gravity (in.)	
	X	Y
0055	1586.9	1098.3

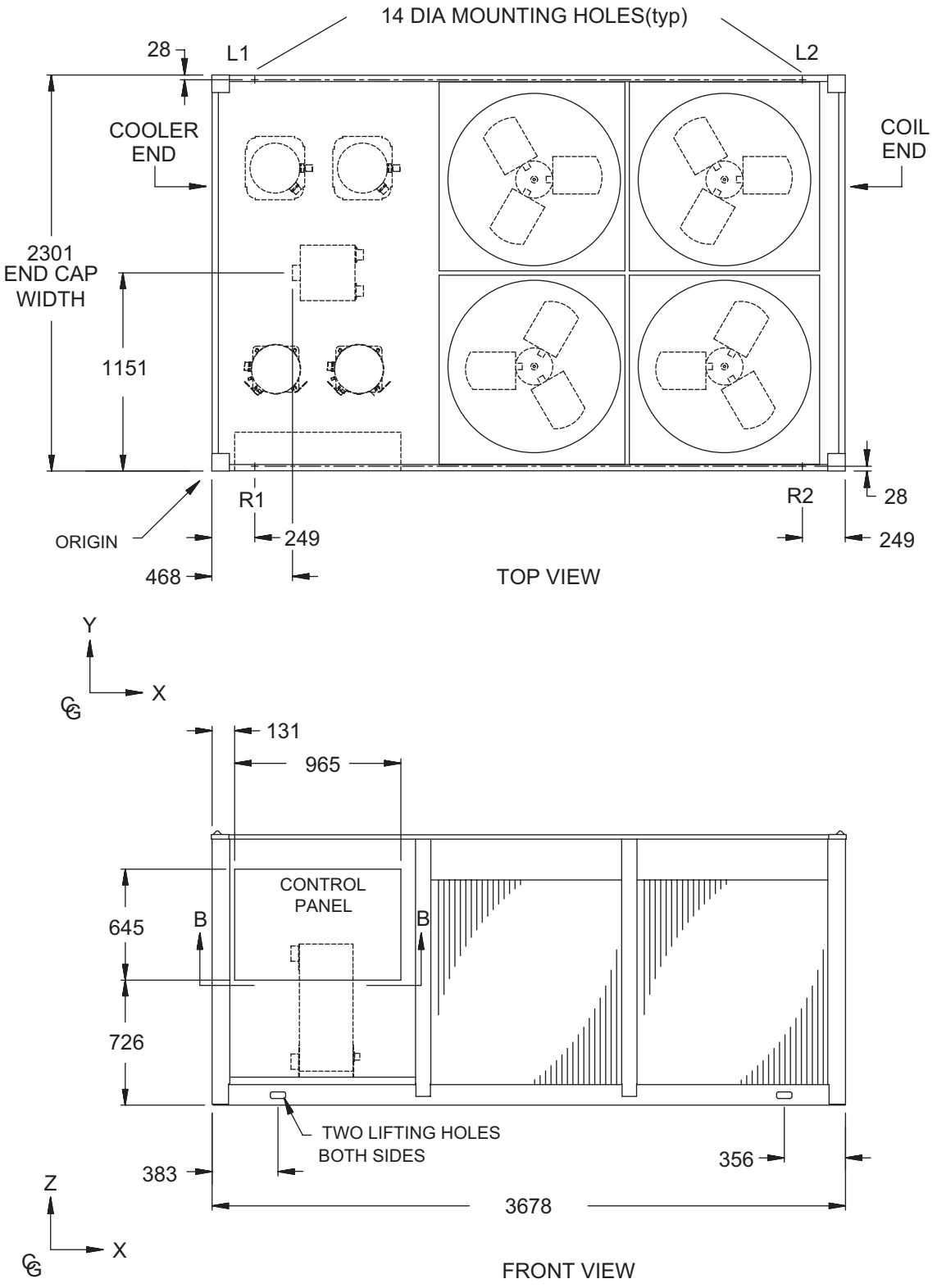
LD10979

NOTE: *All dimensions are in mm unless specified otherwise.*

NOTE:

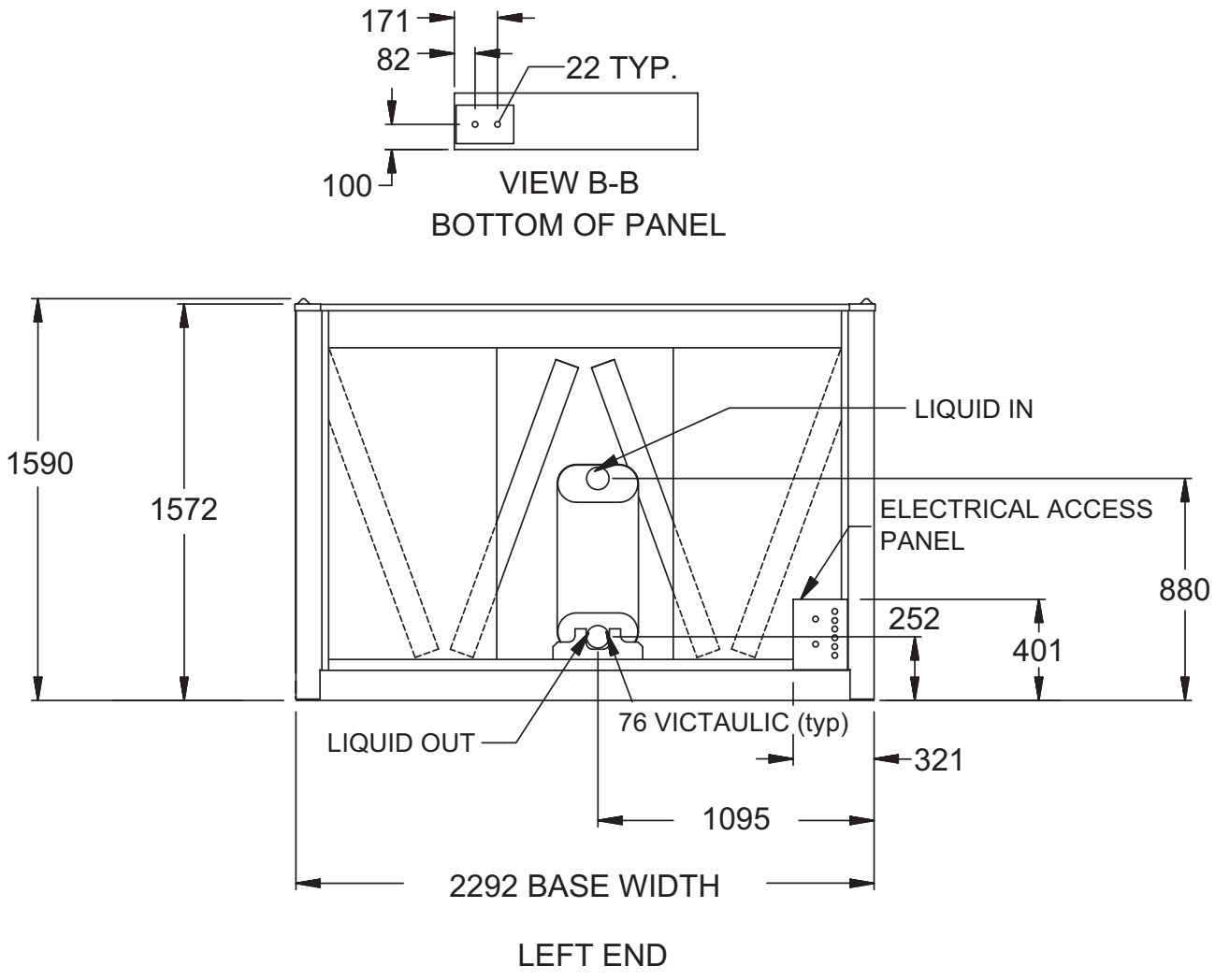
Placement on a level surface of free of obstructions (including snow, for winter operation) or air circulation ensures rated performance, reliable operation, and ease of maintenance. Site restrictions may compromise minimum clearances indicated below, resulting in unpredictable airflow patterns and possible diminished performance. YORK's unit controls will optimize operation without nuisance high-pressure safety cutouts; however, the system designer must consider potential performance degradation. Recommended minimum clearances: front to wall – 2m; rear to wall – 2m; cooler end to wall – 1.2m; coil end to wall - 2m; top – no obstructions allowed; distance between adjacent units – 3m. No more than one adjacent wall may be higher than the unit. 1" nominal deflection isolators (not shown) will increase overall unit height by 152mm.

DIMENSIONS - YCAL0055 (SI) (CON'T)



6

DIMENSIONS - YCAL0061 (SI)



Aluminum		
YCAL	Center of Gravity (in.)	
	X	Y
0061	1438.0	1147.1

Copper		
YCAL	Center of Gravity (in.)	
	X	Y
0061	1569.3	1162.9

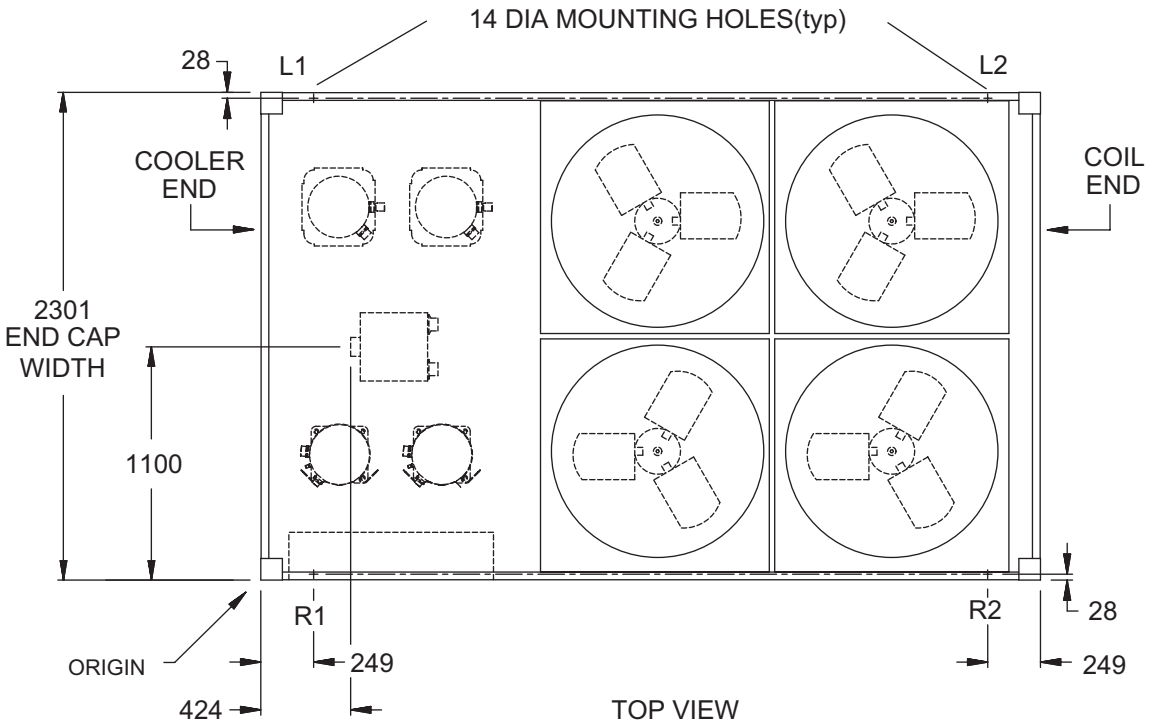
LD10981

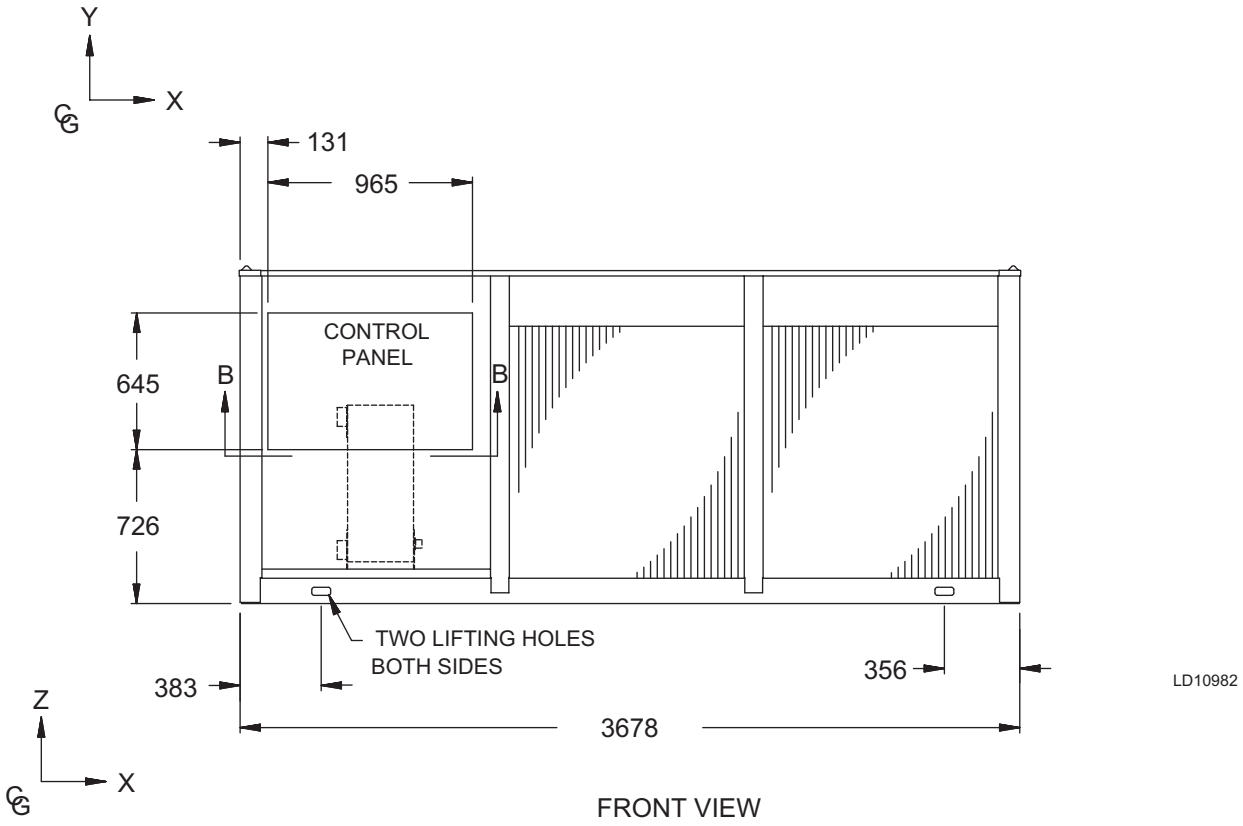
NOTE: *All dimensions are in mm unless specified otherwise.*

NOTE:

Placement on a level surface of free of obstructions (including snow, for winter operation) or air circulation ensures rated performance, reliable operation, and ease of maintenance. Site restrictions may compromise minimum clearances indicated below, resulting in unpredictable airflow patterns and possible diminished performance. YORK's unit controls will optimize operation without nuisance high-pressure safety cutouts; however, the system designer must consider potential performance degradation. Recommended minimum clearances: front to wall – 2m; rear to wall – 2m; cooler end to wall – 1.2m; coil end to wall - 2m; top – no obstructions allowed; distance between adjacent units – 3m. No more than one adjacent wall may be higher than the unit. 1" nominal deflection isolators (not shown) will increase overall unit height by 152mm.

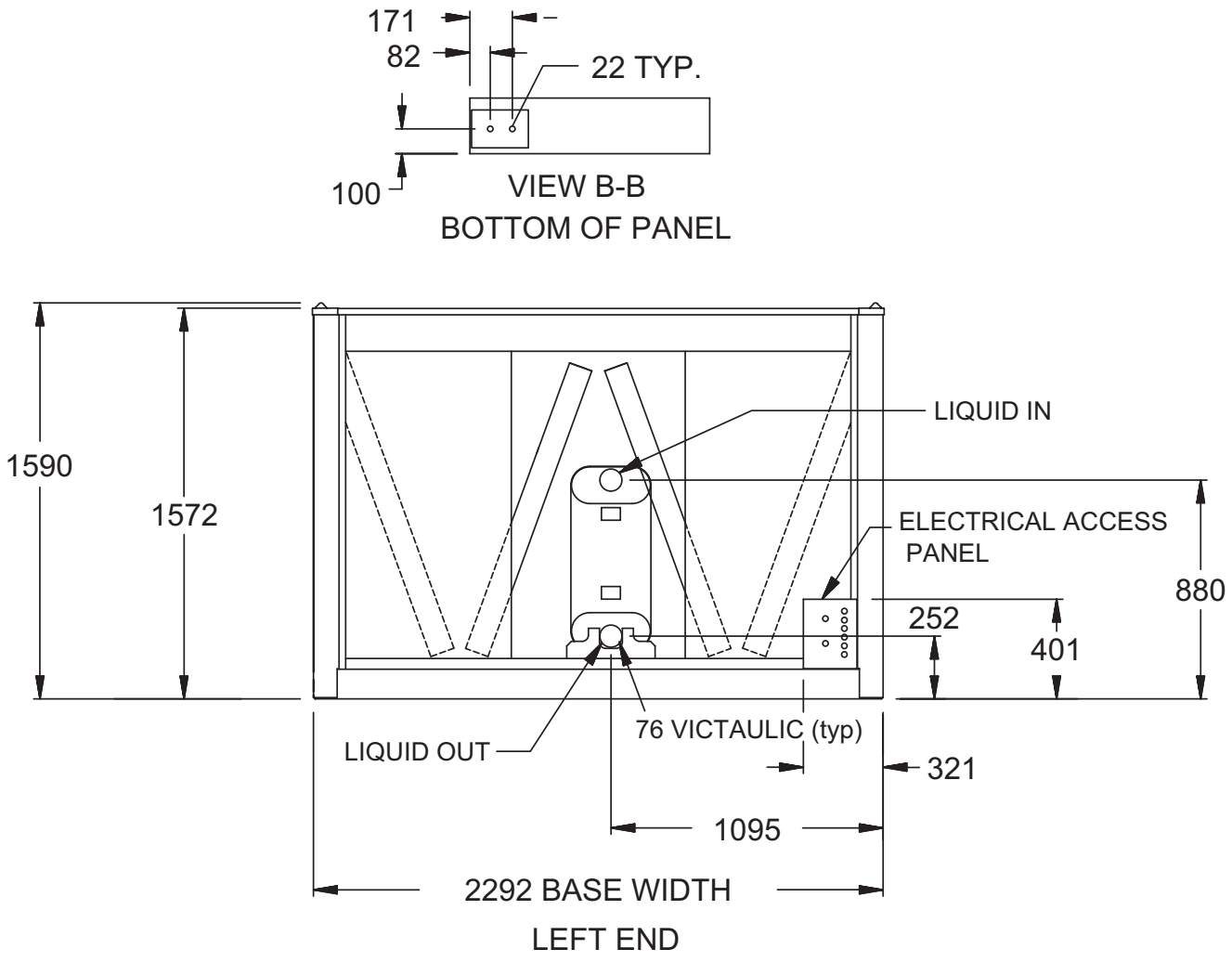
DIMENSIONS - YCAL0061 (SI) (CON'T)





6

DIMENSIONS - YCAL0065 (SI)



Aluminum		
YCAL	Center of Gravity (in.)	
	X	Y
0065	1517.6	1140.3

Copper		
YCAL	Center of Gravity (in.)	
	X	Y
0065	1655.5	1141.1

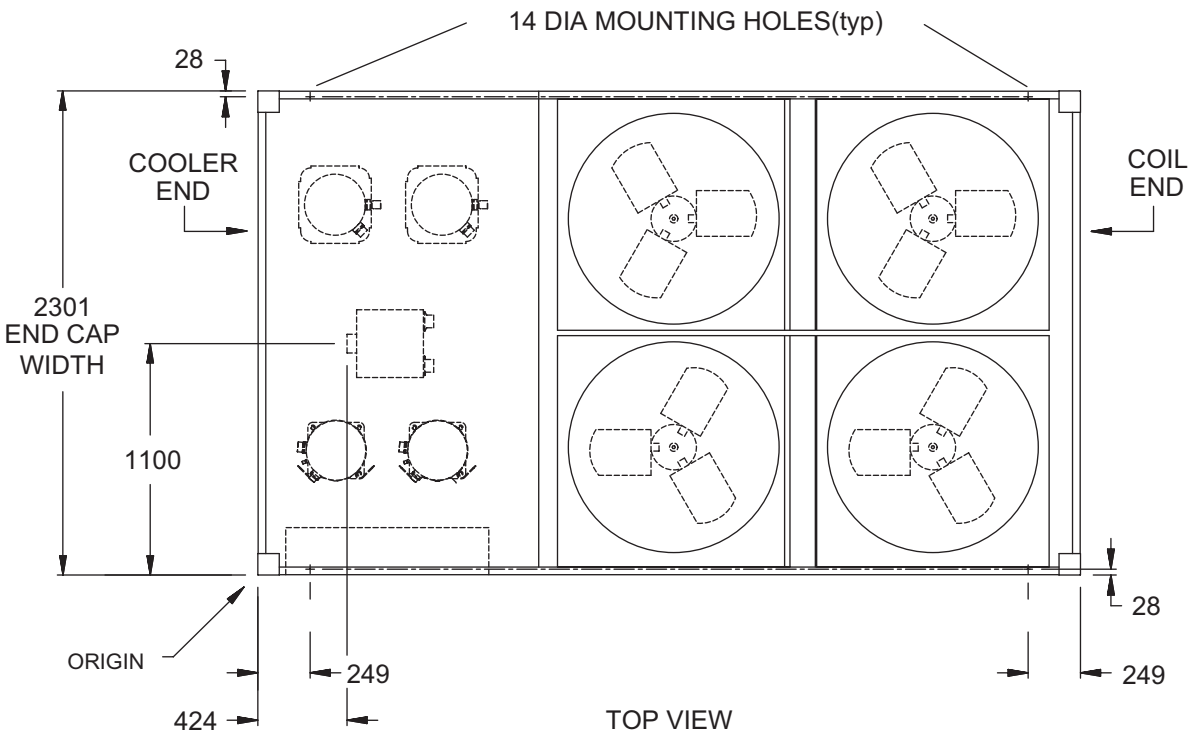
LD10983

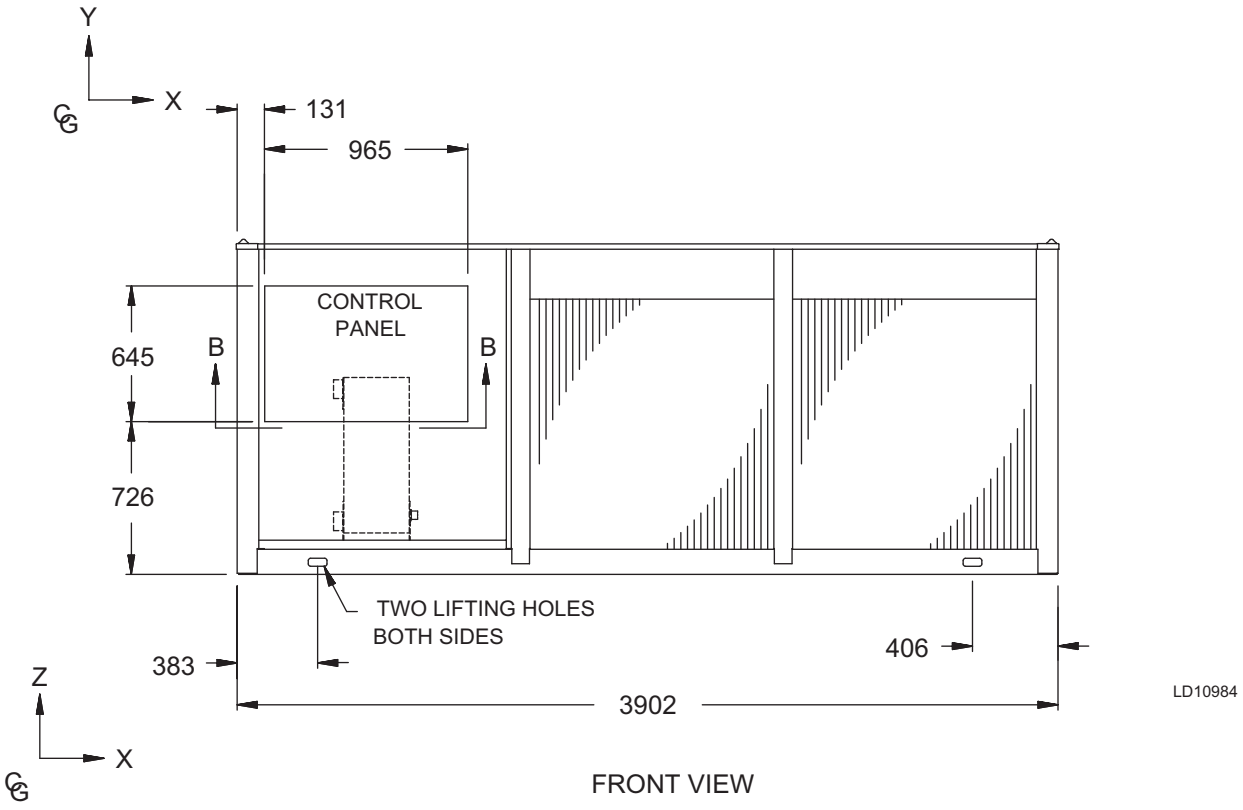
NOTE: *All dimensions are in mm unless specified otherwise.*

NOTE:

Placement on a level surface of free of obstructions (including snow, for winter operation) or air circulation ensures rated performance, reliable operation, and ease of maintenance. Site restrictions may compromise minimum clearances indicated below, resulting in unpredictable airflow patterns and possible diminished performance. YORK's unit controls will optimize operation without nuisance high-pressure safety cutouts; however, the system designer must consider potential performance degradation. Recommended minimum clearances: front to wall – 2m; rear to wall – 2m; cooler end to wall – 1.2m; coil end to wall - 2m; top – no obstructions allowed; distance between adjacent units – 3m. No more than one adjacent wall may be higher than the unit. 1" nominal deflection isolators (not shown) will increase overall unit height by 152mm.

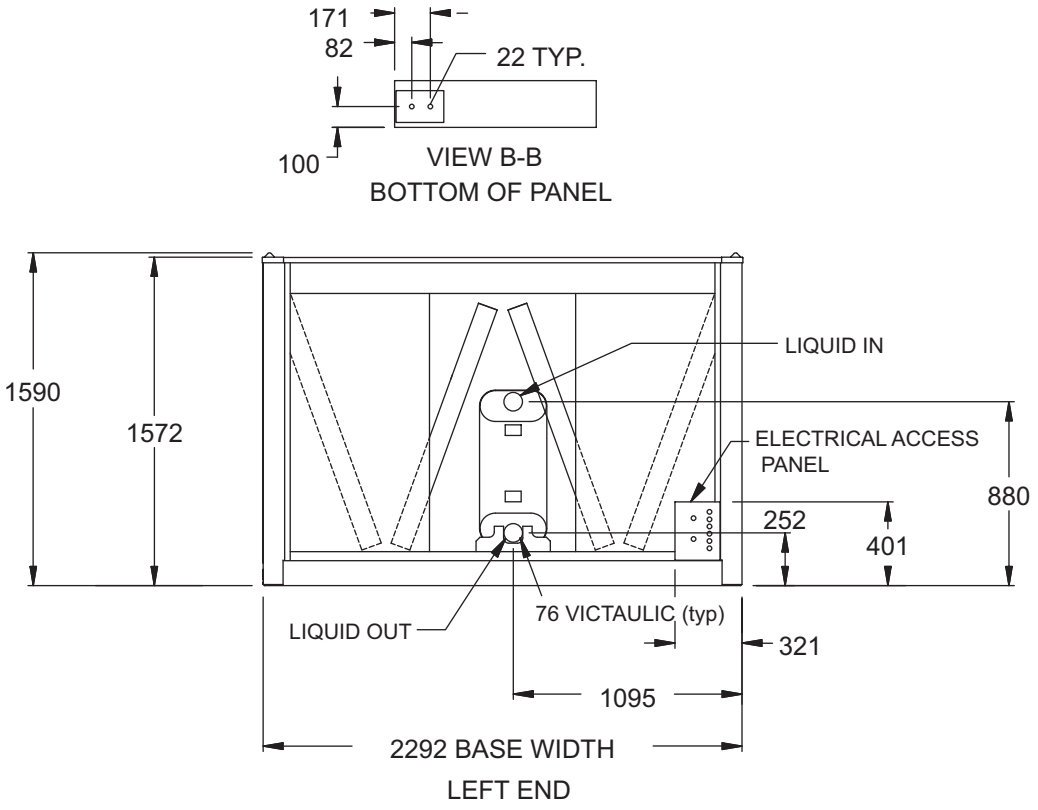
DIMENSIONS - YCAL0065 (SI) (CON'T)





6

DIMENSIONS - YCAL0071 (SI)

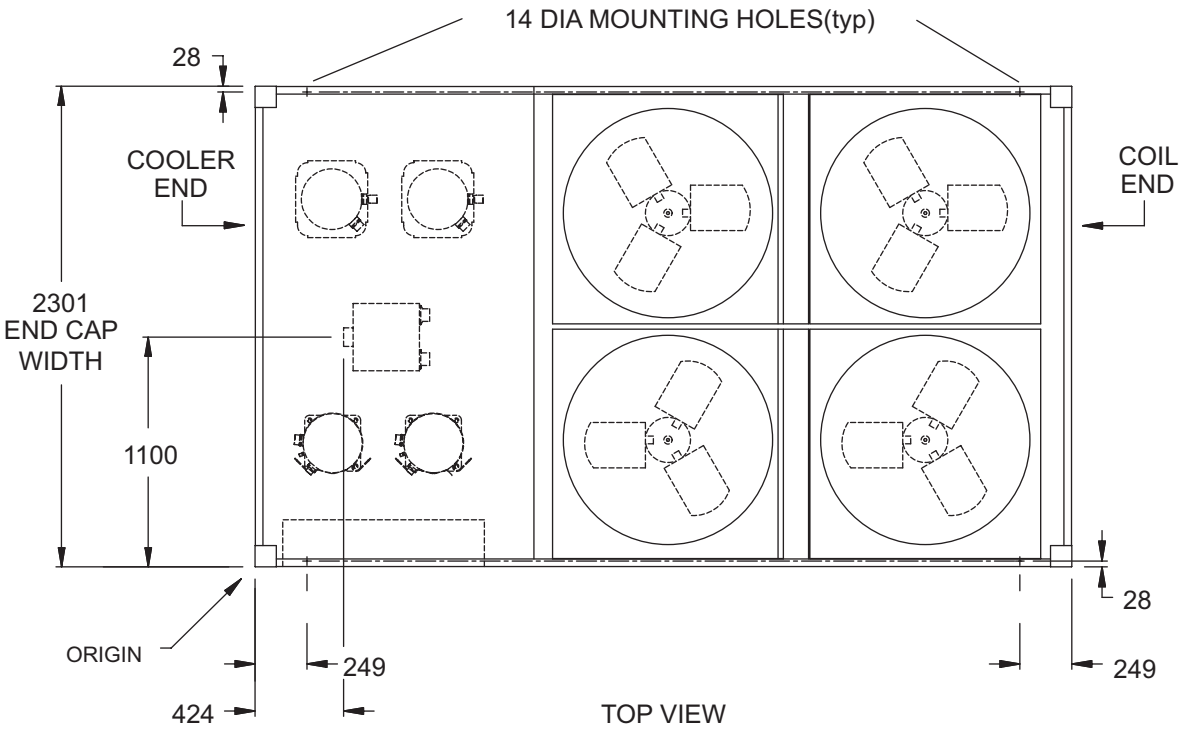


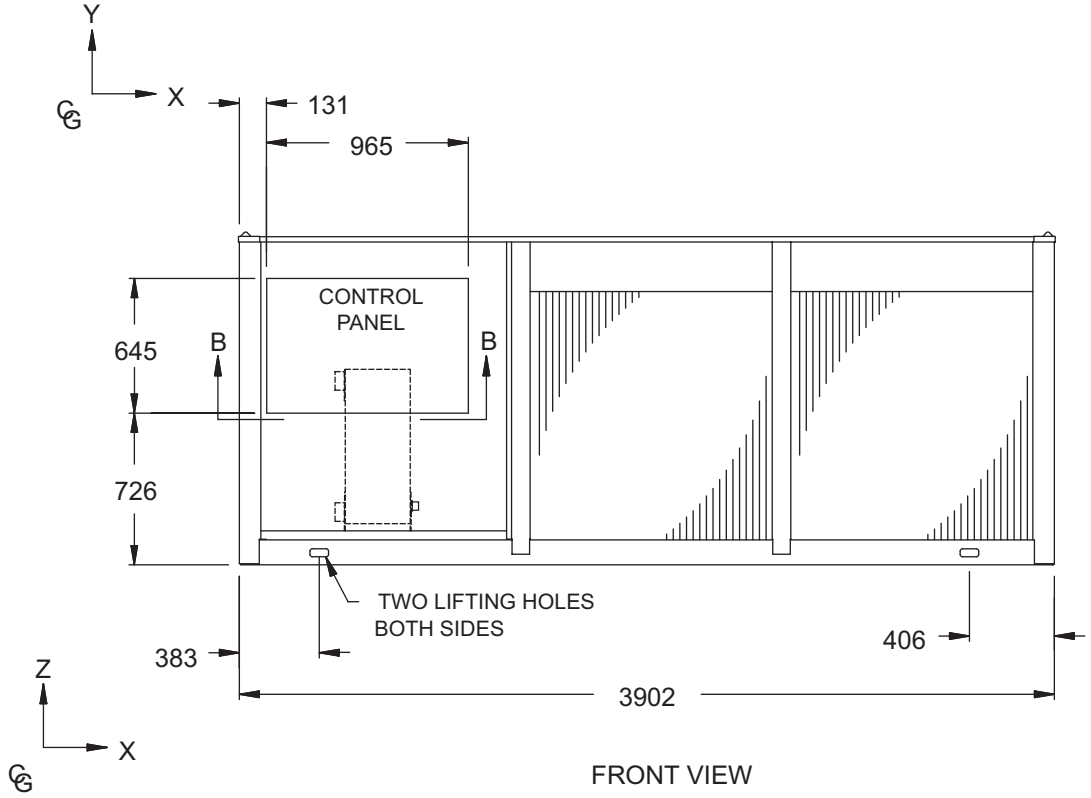
NOTE: *All dimensions are in mm unless specified otherwise.*

NOTE:

Placement on a level surface of free of obstructions (including snow, for winter operation) or air circulation ensures rated performance, reliable operation, and ease of maintenance. Site restrictions may compromise minimum clearances indicated below, resulting in unpredictable airflow patterns and possible diminished performance. YORK's unit controls will optimize operation without nuisance high-pressure safety cutouts; however, the system designer must consider potential performance degradation. Recommended minimum clearances: front to wall – 2m; rear to wall – 2m; cooler end to wall – 1.2m; coil end to wall - 2m; top – no obstructions allowed; distance between adjacent units – 3m. No more than one adjacent wall may be higher than the unit. 1" nominal deflection isolators (not shown) will increase overall unit height by 152mm.

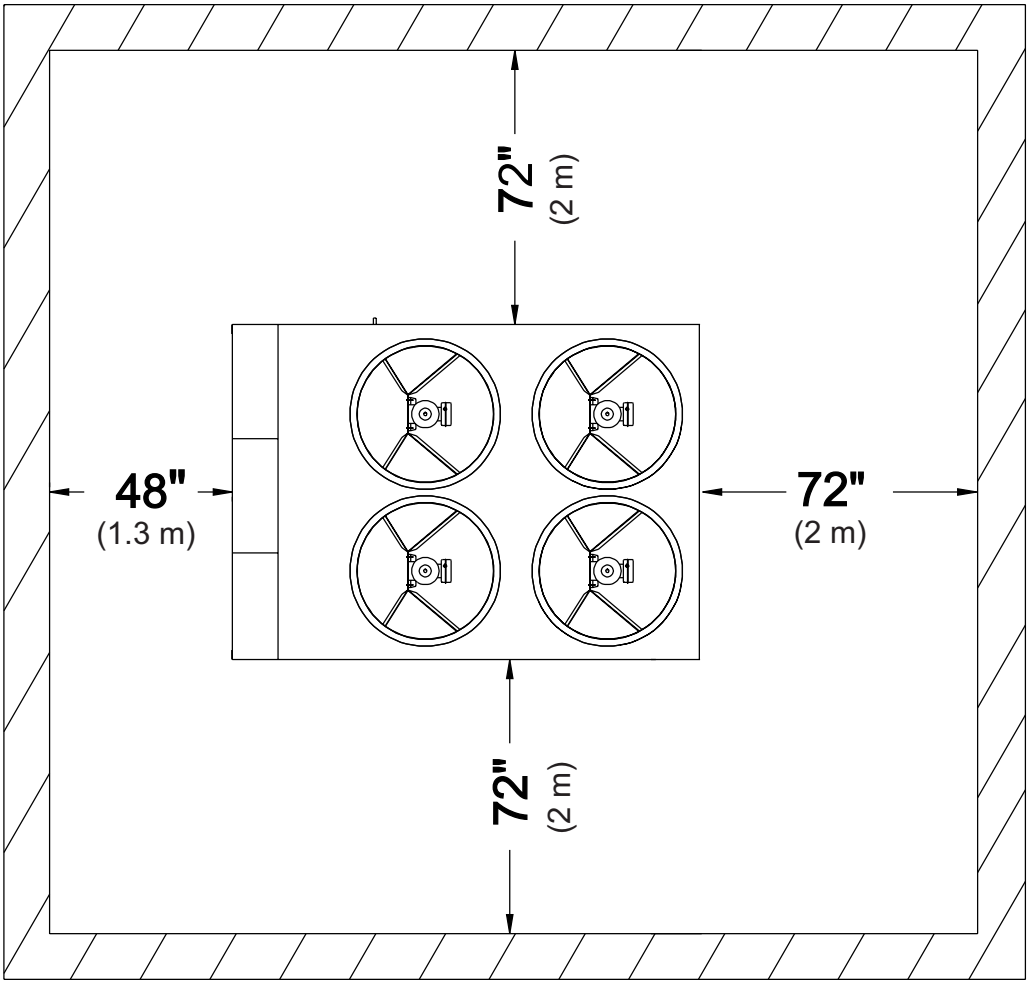
DIMENSIONS - YCAL0071 (SI) (CON'T)





6

TECHNICAL DATA - CLEARANCES



LD10506

NOTES:

1. No obstructions allowed above the unit.
2. Only one adjacent wall may be higher than the unit.
3. Adjacent units should be 10 feet (3 Meters) apart.

FIG. 12 – UNIT CLEARANCES

WEIGHT DISTRIBUTION AND ISOLATOR MOUNTING POSITIONS

GENERAL

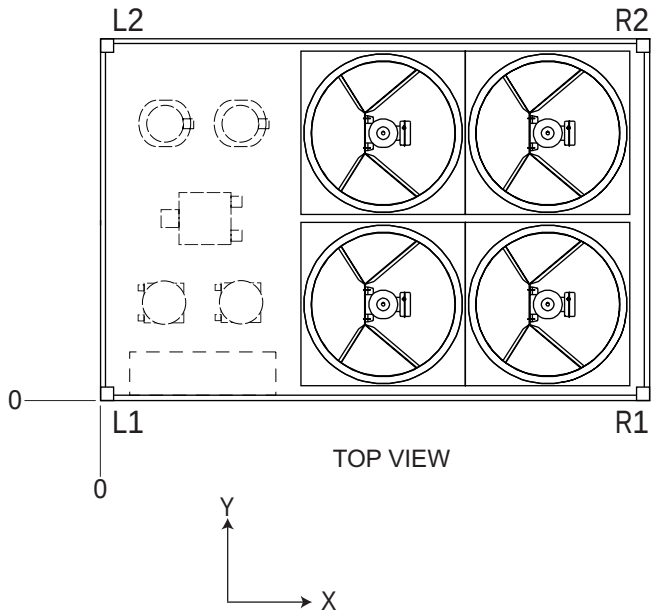
Weights of specific chiller models vary significantly as options are added. As a result, total weights, weights at individual isolator positions, and actual isolator selection at each position cannot be published due to the vast number of possible combinations. This information will be available when the specific chiller/ option selection is made from the local YORK sales office. Be aware, weights will change with each option along with possible isolator changes. Weights and isolators may need to be recalculated when the option selections are changed.

Whenever the isolator option is ordered, the isolators will be shipped loose with the chiller. Packed with the isolators and also in the control panel information packet is a drawing and table specifically for each chiller, based on the option selection. The drawing and table will be similar to the ones shown below. The drawing will show the isolator locations along with the weight in pounds and kilograms at the specific location, isolator position, and location measurements for each isolator.

Approximate Isolator Locations

Order No: 051138540701
Line No: 1

Unit Shipping Weight (Display on unit data nameplate)	kg	lbs.
	1564	3448



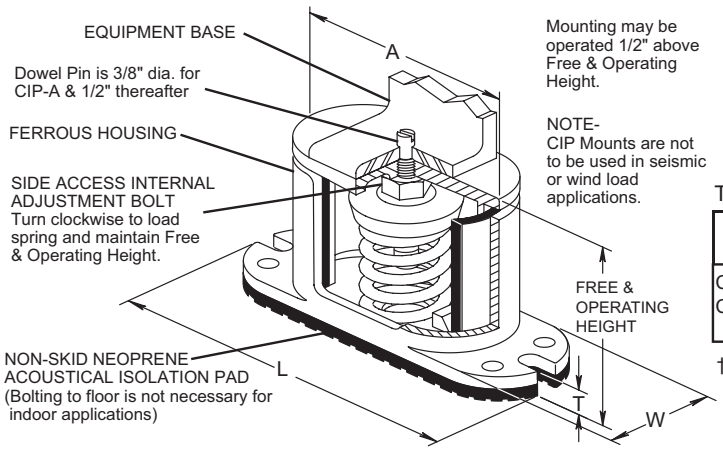
Location	X Distance inches (mm)	Y Distance inches (mm)	Vendor Number	Operating Weight
R1	135.01 (3429.3)	1.09 (27.7)	CIP-B-1000 / Blue	726 (329.3)
L1	9.79 (248.7)	1.09 (27.7)	CIP- B-1650 / Black	1113 (504.9)
R2	135.01 (3429.3)	89.16 (2264.7)	CIP-B-1000 / Blue	648 (293.9)
L2	9.79 (248.7)	89.16 (2264.7)	CIP-B- 1250 / Gray	993 (450.4)

SAMPLE PRINTOUT SUPPLIED IN THE ISOLATOR PACKAGE AND IN THE CHILLER PANEL LITERATURE PACKET.

ONE INCH DEFLECTION SPRING ISOLATOR CROSS-REFERENCE

CIP-X-

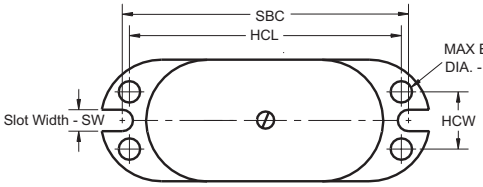
Illustration shows single spring CIP-B or CIP-C mount.


EQUIPMENT BASE
Dowel Pin is 3/8" dia. for CIP-A & 1/2" thereafter
FERROUS HOUSING
SIDE ACCESS INTERNAL ADJUSTMENT BOLT Turn clockwise to load spring and maintain Free & Operating Height.
NON-SKID NEOPRENE ACOUSTICAL ISOLATION PAD (Bolting to floor is not necessary for indoor applications)
A
L
T
W
FREE & OPERATING HEIGHT
Mounting may be operated 1/2" above Free & Operating Height.
NOTE- CIP Mounts are not to be used in seismic or wind load applications.

TYPE CIP DIMENSIONS (inches)†

Size	A	L	T	W	SW	HCL	HCW	MBD	SBC	Free Ht.	Min Ht.
CIP-B	5 3/4	8 1/4	1/2	2 3/4	7/16	6 1/2	1 1/2	3/8	7 1/4	6 1/8	5 1/4
CIP-C	6 5/8	8 7/8	9/16	3 1/2	7/16	7 1/4	1 3/4	3/8	7 7/8	6 3/4	6 3/4

†Casting dimensions may vary ±1/8"



BASE PLATE DIMENSIONS

All springs have additional travel to solid equal to 50% of the rated deflection.

FOR UNITS WITH ALL POINT LOADS LESS THATN 1404 LBS (637 KG)				
Weight Range (lbs)	**Weight Range (kg)**	**Model Number**	**Color**	**YORK P/N**
239 to 384 lbs	108 to 174 kg	CIP-B-	Red	029-24583-002
384 to 639 lbs	174 to 290 kg	CIP-B-	White	029-24583-003
639 to 851 lbs	290 to 386 kg	CIP-B-	Blue	029-24583-004
851 to 1064 lbs	386 to 483 kg	CIP-B-	Gray	029-24583-005
1064 to 1404 lbs	483 to 637 kg	CIP-B-	Black	029-24583-006

FOR UNITS WITH ANY POINT LOAD ABOVE 1404 LBS (637 KG)				
Weight Range (lbs)	**Weight Range (kg)**	**Model Number**	**Color**	**YORK P/N**
Up to 851 lbs	Up to 386 kg	CIP-C-	Black	029-24583-007
851 to 1149 lbs	386 to 521 kg	CIP-C-	Yellow	029-24583-008
1149 to 1489 lbs	521 to 675 kg	CIP-C-	Black	029-24583-009
1489 to 1786 lbs	675 to 910 kg	CIP-C-	Yellow w/ Red	029-24583-010
1786 to 2028 lbs	910 to 920 kg	CIP-C-	Yellow w/ Green	029-24583-011
2028 to 2254 lbs	920 to 1022 kg	CIP-C-	Red w/ Red	029-24583-012
2254 to 2936 lbs	1022 to 1332 kg	CIP-C-	Red w/ Green	029-24583-013

INSTALLATION OF 1" DEFLECTION MOUNTS

1. Floor or steel frame should be level and smooth.

2. For pad installations, isolators do not normally require bolting. If necessary, anchor isolators to floor through bolt holes in the base plate.

Isolators must be bolted to the substructure and the equipment must be bolted to the isolators when outdoor equipment is exposed to wind forces.

3. Lubricate the threads of adjusting bolt. Loosen the hold down bolts to allow for isolator adjustment.

4. Block the equipment 10mm (1/4”) higher than the specified free height of the isolator. To use the isolator as blocking for the equipment, insert a 10mm (1/4”) shim between the upper load plate and vertical uprights. Lower the equipment on the blocking or shimmed isolators.

5. Complete piping and fill equipment with water, refrigerant, etc.

6. Turn leveling bolt of first isolator four full revolutions and proceed to each mount in turn.

7. Continue turning leveling bolts until the equipment is fully supported by all mountings and the equipment is raised free of the spacer blocks or shims. Remove the blocks or shims.

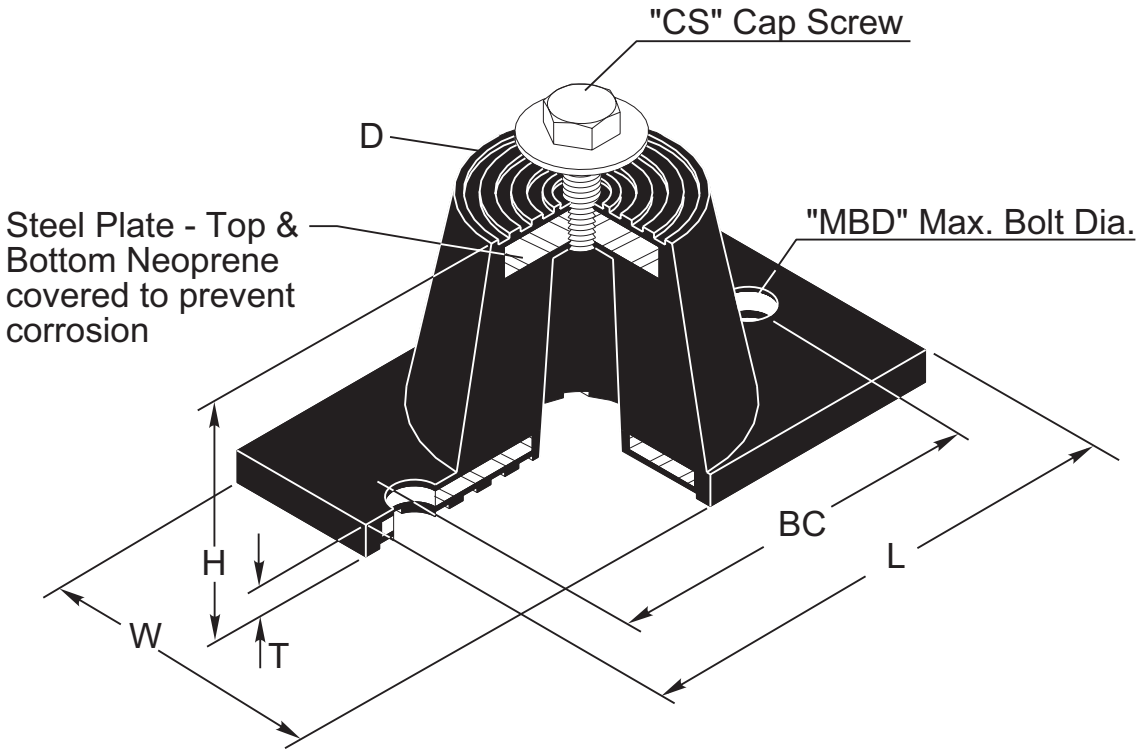
8. Turn the leveling bolt of all mountings in either direction in order to level the installation.

9. Tighten the nuts on hold down bolts to permit a clearance of 2mm (1/8”) between resilient washer and underside of channel cap plate.

10. Installation is now complete.

NEOPRENE ISOLATOR CROSS-REFERENCE

ND-X



ENGLISH								
Size	**D**	**H**	**L**	**T**	**W**	**BC**	**CS**	**MBD**
ND-C	2 9/16	2 3/ 4	5 1/ 2	1/ 4	2 5/16	4 1/80	1/2- 13 x 1”	1/ 2"
ND-D	3 3/ 8	2 3/ 4	6 1/ 4	5/16	4	5	1/2- 13 x 1”	1/ 2"
ND-E	4 1/ 2	4 3/ 4	7 3/ 8	1/ 4	5 1/80	6 1/80	1/2- 13 x 1”	1/ 2"

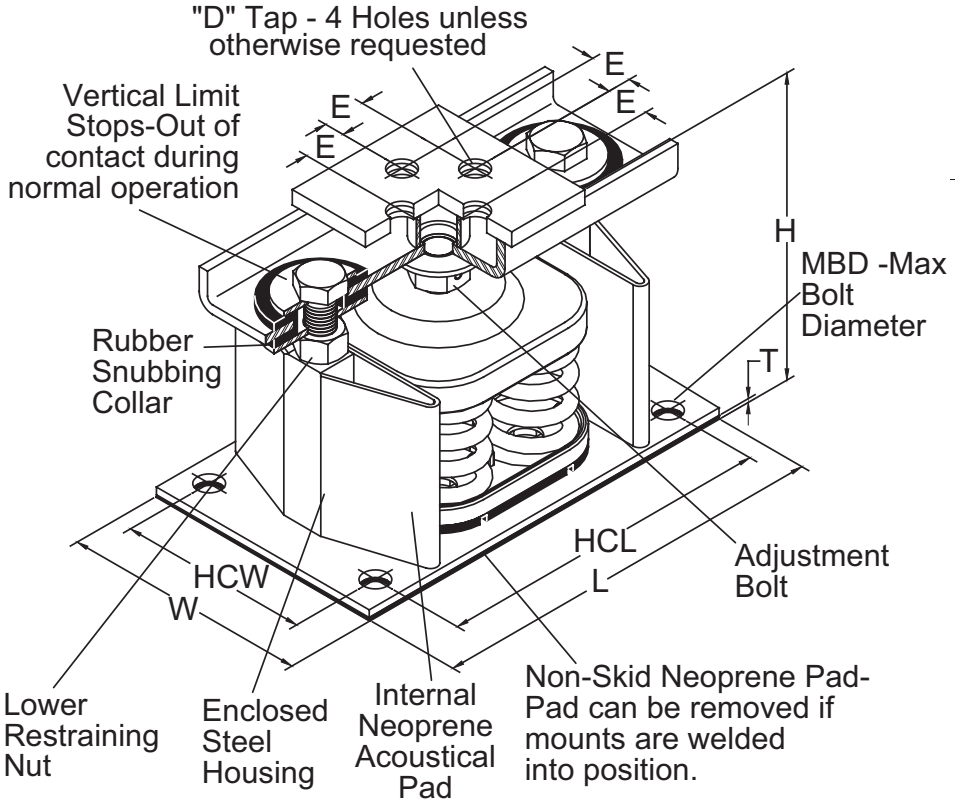
SI								
ND-C	65.1	69.9	139.7	6.4	58.7	101.9	1/2- 13 x 1”	1/ 2"
ND-D	85.7	69.9	158.8	7.9	101.6	127.0	1/2- 13 x 1”	1/ 2"
ND-E	114.3	120.7	187.3	6.4	127.3	152.7	1/2- 13 x 1”	1/ 2"

Weight Range (lbs)	Weight Range (kg)	Model Number	Color
Up to 751 lbs	Up to 341 kg	ND-C	Yellow
751 to 1651 lbs	341 to 749 kg	ND-D	Yellow
1651 to 3226 lbs	749 to 1463 kg	ND-E	Yellow

TWO INCH DEFLECTION, SEISMIC SPRING ISOLATOR CROSS-REFERENCE

SLRS

SLRS-2-C2 has 2 springs.



NOTES: Illustration above shows a SLRS-4-C2 (4 springs). SLRS-8-2 & C2 have 1 spring, and SLRS-2-C2 has two springs. SLRS-6-C2 has six springs and SLRS-9-C2 has nine springs.

ENGLISH									
SIZE	**H**	**T**	**D**	**E**	**L**	**HCL**	**W**	**HCW**	**MBD**
2-C2	8-1/2”	3/8”	5/8”	1-3/8”	14”	12-1/4”	5-1/4”	3-1/ 2”	5/8"

SI									
SIZE	**H**	**T**	**D**	**E**	**L**	**HCL**	**W**	**HCW**	**MBD**
2-C2	215.9	9.5	15.9	34.9	355.6	311.2	133.4	88.9	5/8"

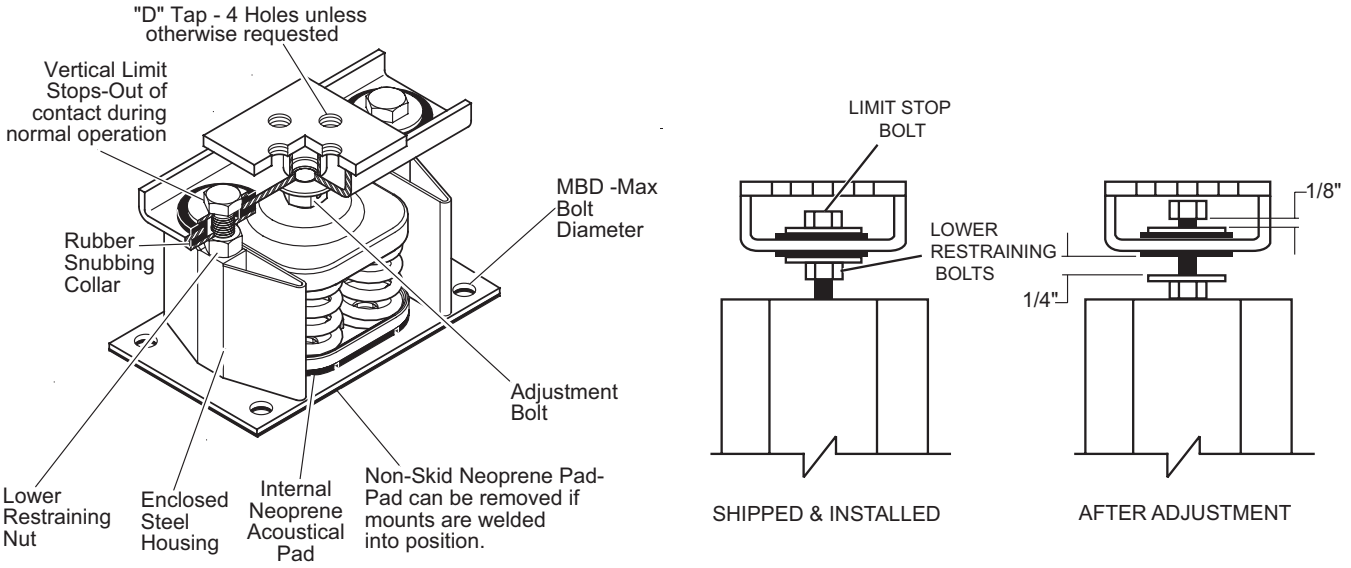
*Weight Range (lbs)	Weight Range (kg)	Model Number	Color	YORK P/N
Up to 358 lbs	Up to 162 kg	SLRS-2-C2-	Red	029-24585-006
358 to 443 lbs	162 to 201 kg	SLRS-2-C2-	White	029-24585-007
443 to 582 lbs	201 to 264 kg	SLRS-2-C2-	Black	029-24585-008
582 to 783 lbs	264 to 335 kg	SLRS-2-C2-	Blue	029-24585-009
783 to 1038 lbs	335 to 471 kg	SLRS-2-C2-	Green	029-24585-010
1038 to 1497 lbs	471 to 679 kg	SLRS-2-C2-	Gray	029-24585-011
1497 to 2058 lbs	679 to 933 kg	SLRS-2-C2-	Silver	029-24585-012
2058 to 2619 lbs	933 to 1188 kg	SLRS-2-C2-	Gray w/ red	029-24585-013
2619 to 3180 lbs	1188 to 1442 kg	SLRS-2-C2-	Silver w/ red	029-24585-014

*Value is de-rated by 15%

SLRS SEISMIC ISOLATOR INSTALLATION AND ADJUSTMENT

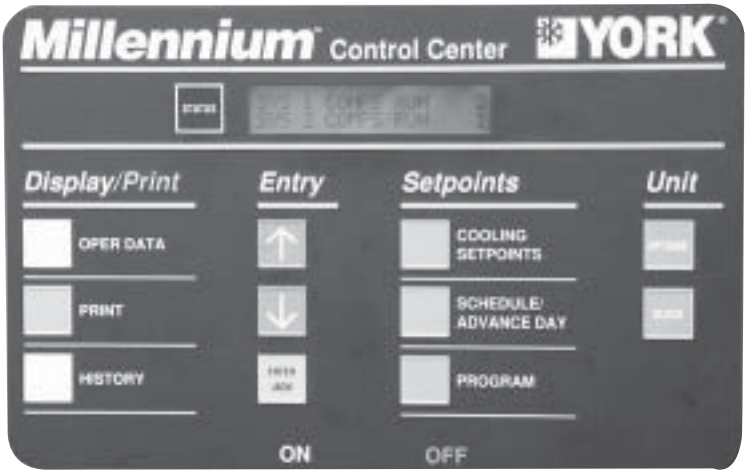
TO INSTALL AND ADJUST MOUNTS

1. Supports for mountings must be leveled to installation's acceptable tolerances.
2. Mountings not subjected to seismic or wind forces do not require bolting to supports.
3. Mountings subjected to seismic or wind forces must be bolted or welded in position.
4. If mountings are welded in position, remove lower friction pad before welding.
5. Set mountings with top channels held in place by the lower restraining nuts and limit stops.
6. Place equipment on mountings and secure by bolting or welding.
7. Hold lower restraining nut in place and turn vertical limit stop bolt counter-clockwise until there is a 1/8" gap between the bolt head and the steel washer.
8. Turn adjustment bolt 8 turns on each mount.
9. Take one additional complete turn on each adjustment bolt in sequence until the top plate lifts off of the lower restraining nuts. Take no additional turns on that mount. Continue with equal turns on the other mounts until the top plates lift off of the lower restraining nuts of all mounts.
10. Hold the limit stop bolt in place and turn the lower restraining nut clockwise and tighten it against the stanchion. Repeat the same procedure on all mounts.
11. Top plate should remain at a fixed elevation, plus or minus 1/8".


"D" Tap - 4 Holes unless otherwise requested
Vertical Limit Stops-Out of contact during normal operation
MBD -Max Bolt Diameter
Rubber Snubbing Collar
Adjustment Bolt
Lower Restraining Nut
Enclosed Steel Housing
Internal Neoprene Acoustical Pad
Non-Skid Neoprene Pad-Pad can be removed if mounts are welded into position.
LIMIT STOP BOLT
LOWER RESTRAINING BOLTS
1/8"
1/4"
SHIPPED & INSTALLED
AFTER ADJUSTMENT

LD10568

SECTION 7 - UNIT CONTROLS
YORK *MILLENNIUM* CONTROL CENTER



00065VIP

INTRODUCTION

The YORK MicroComputer Control Center is a microprocessor based control system designed to provide the entire control for the liquid chiller. The control logic embedded in the microprocessor based control system will provide control for the chilled liquid temperatures, as well as sequencing, system safeties, displaying status, and daily schedules. The MicroComputer Control Center consists of four basic components, 1) microprocessor board, 2) transformer, 3) display and 4) keypad. The keypad allows programming and accessing setpoints, pressures, temperatures, cutouts, daily schedule, options, and fault information.

Remote cycling, demand limiting and chilled liquid temperature reset can be accomplished by field supplied contacts.

Compressor starting/stopping and loading/unloading decisions are performed by the Microprocessor to maintain leaving or return chilled liquid temperature. These decisions are a function of temperature deviation from setpoint.

A Master ON/Off switch is available to activate or deactivate the unit.

MICROPROCESSOR BOARD

The Microprocessor Board is the controller and decision maker in the control panel. System inputs such as pressure transducers and temperature sensors are connected directly to the Microprocessor Board. The Microprocessor Board circuitry multiplexes the analog inputs, digitizes them, and scans them to keep a constant watch on the chiller operating conditions. From this information, the Microprocessor then issues commands to the Relay Outputs to control contactors, solenoids, etc. for Chilled Liquid Temperature Control and to react to safety conditions.

Keypad commands are acted upon by the micro to change setpoints, cutouts, scheduling, operating requirements, and to provide displays.

The on-board power supply converts 24VAC from the 1T transformer to a +12VDC and +5VDC regulated supply located on the Microprocessor Board. This voltage is used to operate integrated circuitry on the board. The 40 character display and unit sensors are supplied power from the microboard 5VDC supply.

24VAC is rectified and filtered to provide unregulated +30VDC to supply the flow switch, PWM remote temperature reset, and demand limit circuitry which is available to be used with field supplied contacts. The Microprocessor Board energizes on-board relays to output 120VAC to motor contactors, solenoid valves, etc. to control system operation. 120VAC is supplied to the optimal T3 Transformer, which supplies 12VAC to the bridge diode module. The Bridge Diode Module rectifies the voltage to -12V unreg. The +12V unreg voltage supplies power to the Remote Temp. Reset Circuit Board.

UNIT SWITCH

A unit ON/OFF switch is just underneath the keypad. This switch allows the operator to turn the entire unit "OFF" if desired. The switch must be placed in the "ON" position for the chiller to operate.

DISPLAY

The 40 Character Display (2 lines of 20 characters) is a liquid crystal display used for displaying system parameters and operator messages.

The display in conjunction with the keypad, allows the operator to display system operating parameters as well as access programmed information already in memory. The display has a lighted background for night viewing and for viewing in direct sunlight.

When a key is pressed, such as the OPER DATA key, system parameters will be displayed and will remain on the display until another key is pressed. The system parameters can be scrolled with the use of the ↑ (UP) and ↓ (DOWN) arrow keys. The display will update all information at a rate of about 1 a second.

Display Messages may show characters indicating "greater than" (>) or "less than" (<). These characters indicate the actual values are greater than or less than the limit values which are being displayed.

KEYPAD

The 12 button non-tactile keypad allows the user to retrieve vitals system parameters such as system pressures, temperatures, compressor running times and starts, option information on the chiller, and system setpoints. This data is useful for monitoring chiller operation, diagnosing potential problems, troubleshooting, and commissioning the chiller.

It is essential the user become familiar with the use of the keypad and display. This will allow the user to make full use of the capabilities and diagnostic features available.

BATTERY BACK-UP

The Microprocessor Board contains a Real Time Clock integrated circuit chip with an internal battery backup. The purpose of this battery backup is to assure any programmed values (setpoints, clock, cutouts, etc.) are not lost during a power failure regardless of the time involved in a power cut or shutdown period.

TRANSFORMER

A 40 VA, 120/24VAC 50/60Hz transformer is provided to supply power to the Microprocessor Board, which in turn rectifies, filters, and regulates as necessary to supply power to the display, sensors, and transducers.

SINGLE SYSTEM SELECT AND PROGRAMMING # OF COMPRESSORS

The control software is common between single (1) and dual (2) system units. A jumper is installed between terminals 13 and 17 on the user terminal block to configure a unit for a single system. Dual (2) system chillers do not have a jumper installed. The jumper is only checked by the micro on power-up.

The total number of compressors is programmable under the Program Key. Single (1) system chillers can have 2 or 3 compressors. Dual (2) system chillers can have 4, 5, or 6 compressors.

"STATUS" KEY

00066VIP

UNIT STATUS

Pressing the STATUS key will enable the operator to determine current chiller operating status. The messages displayed will include running status, cooling demand, fault status, external cycling device status. The display will be a single message relating to the highest priority message as determined by the micro. Status messages fall into the categories of General Status and Fault Status.

The following General, Safety, and Warning messages are displayed when the Status key is pressed. Following each displayed message is an explanation pertaining to that particular message.

GENERAL STATUS MESSAGES

In the case of messages which apply to individual systems, SYS 1 and SYS 2 messages will both be displayed and may be different. In the case of single system units, all SYS 2 messages will be blank.

UNIT SWITCH OFF
SHUTDOWN

This message informs the operator that the UNIT switch on the control panel is in the OFF position which will not allow the unit to run.

REMOTE CONTROLLED
SHUTDOWN

The REMOTE CONTROLLED SHUTDOWN message indicates that either an ISN system or RCC has turned the unit "OFF", not allowing it to run.

DAILY SCHEDULE
SHUTDOWN

The DAILY SCHEDULE SHUTDOWN message indicates that the daily/holiday schedule programmed is keeping the unit from running.

FLOW SWITCH/REM STOP
NO RUN PERM

NO RUN PERM shows that either the flow switch is open or a remote start/stop contact is open in series with the flow switch. A 3-second delay is built into the software to prevent nuisance shutdowns due to erroneous signals on the run permissive input.

SYS 1 SYS SWITCH OFF
SYS 2 SYS SWITCH OFF

SYS SWITCH OFF tells that the system switch under OPTIONS is turned "OFF". The system will not be allowed to run until the switch is turned back on.

```
SYS 1 NO COOL LOAD
SYS 2 NO COOL LOAD
```

This message informs the operator that the chilled liquid temperature is below the point (determined by the setpoint and control range) that the micro will bring on a system or that the micro has not loaded the lead system far enough into the loading sequence to be ready to bring the lag system "ON". The lag system will display this message until the loading sequence is ready for the lag system to start.

```
SYS 1 COMPS RUN X
SYS 2 COMPS RUN X
```

The COMPS RUNNING message indicates that the respective system is running due to demand. The "X" will be replaced with the number of compressors in that system that are running.

```
SYS 1 AR TIMER XX S
SYS 2 AR TIMER XX S
```

The anti-recycle timer message shows the amount of time left on the respective systems anti-recycle timer. This message is displayed when the system is unable to start due the anti-recycle timer being active.

```
SYS 1 AC TIMER XX S
SYS 2 AC TIMER XX S
```

The anti-coincidence timer is a software feature that guards against 2 systems starting simultaneously. This assures instantaneous starting current does not become excessively high due to simultaneous starts. The micro limits the time between compressor starts to 1 minute regardless of demand or the anti-recycle timer being timed out. The anti-coincidence timer is only present on two system units.

```
SYS 1 DSCH LIMITING
SYS 2 DSCH LIMITING
```

When this message appears, discharge pressure limiting is in effect. The Discharge Pressure Limiting feature is integral to the standard software control; however the discharge transducer is optional on some models. Therefore, it is important to keep in mind that this control will not function unless the discharge transducer is installed in the system.

The limiting pressure is a factory set limit to keep the system from faulting on the high discharge pressure cutout due to high load or pull down conditions. When the unload point is reached, the micro will automatically unload the affected system by de energizing one compressor. The discharge pressure unload will occur when the discharge pressure gets within 15 PSIG of the programmed discharge pressure cutout. This will only happen if the system is fully loaded and will shut only one compressor off. If the system is not fully loaded, discharge limiting will not go into effect. Reloading the affected system will occur when the discharge pressure drops to 85% of the unload pressure and 10 minutes have elapsed.

```
SYS 1 SUCT LIMITING
SYS 2 SUCT LIMITING
```

When this message appears, suction pressure limiting is in effect. The suction pressure limit is a control point that limits the loading of a system when the suction pressure drops to within 15% above the suction pressure cutout. On a standard system programmed for 44 PSIG/3.0 Bar suction pressure cutout, the micro would inhibit loading of the affected system with the suction pressure less than or equal to 1.15 * 44 PSIG/3.0 Bar = 50 PSIG/3.5 Bar. The system will be allowed to load after 60 seconds and after the suction pressure rises above the suction pressure load limit point.

```
SYS 1 LOAD LIMIT XX%
SYS 2 LOAD LIMIT XX%
```

This message indicates that load limiting is in effect and the percentage of the limiting in effect. This limiting could be due to the load limit/pwm input, ISN or RCC controller sending a load limit command.

```
MANUAL
OVERRIDE
```

If MANUAL OVERRIDE mode is selected, the STATUS display will display this message. This will indicate that the Daily Schedule is being ignored and the chiller will start-up when chilled liquid temperature allows, Remote Contacts, UNIT switch and SYSTEM switches permitting. This is a priority message and cannot be overridden by anti-recycle messages, fault messages, etc. when in the STATUS display mode. Therefore, do not expect to see any other STATUS messages when in the MANUAL OVERRIDE mode. MANUAL OVERRIDE is to only be used in emergencies or for servicing. Manual override mode automatically disables itself after 30 minutes.

```
SYS 1 PUMPING DOWN
SYS 2 PUMPING DOWN
```

The PUMPING DOWN message indicates that a compressor in the respective system is presently in the process of pumping the system down. When pumpdown is initiated on shutdown, the liquid line solenoid or EEV will close and a compressor will continue to run. When the suction pressure decreases to the suction pressure cutout setpoint or runs for 180 seconds, whichever comes first, the compressor will cycle off.

FAULT SAFETY STATUS MESSAGES

Safety Status messages appear when safety thresholds in the unit have been exceeded. Safeties are divided into two categories – system safeties and unit safeties. System safeties are faults that cause the individual system to be shut down. Unit safeties are faults that cause all running compressors to be shut down. Following are display messages and explanations.

System Safeties

System safeties are faults that cause individual systems to be shut down if a safety threshold is exceeded for 3 seconds. They are auto reset faults in that the system will be allowed to restart automatically after the fault condition is no longer present. However, if 3 faults on the same system occur within 90 minutes, that system will be locked out on the last fault. This condition is then a manual reset. The system switch (under OPTIONS key) must be turned off and then back on to clear the lockout fault. Fault messages will be displayed whenever a system is locked out.

```
SYS 1 HIGH DSCH PRES
SYS 2 HIGH DSCH PRES
```

The Discharge Pressure Cutout is a software cutout in the microprocessor and is backed-up by a mechanical high pressure cutout switch located in the refrigerant circuit. It assures that the system pressure does not exceed safe working limits. The system will shutdown when the programmable cutout is exceeded and will be allowed to restart when the discharge pressure falls 40 PSIG below the cutout. *Discharge transducers must be installed for this function to operate.*

```
SYS 1 LOW SUCT PRESS
SYS 2 LOW SUCT PRESS
```

The Suction Pressure Cutout is a software cutout that helps protect the chiller from an evaporator freeze-up should the system attempt to run with a low refrigerant charge or a restriction in the refrigerant circuit.

Repeated starts after resetting a low suction pressure fault will cause evaporator freeze-up. Whenever a system locks out on this safety, immediate steps should be taken to identify the cause.

At system start, the cutout is set to 10% of programmed value. During the next 3 minutes the cutout point is ramped up to the programmed cutout point. If at any time during these 3 minutes the suction pressure falls below the ramped cutout point, the system will stop. *This cutout is completely ignored for the first 30 seconds of system run time to avoid nuisance shutdowns, especially on units that utilize a low pressure switch in place of the suction pressure transducer.*

After the first 3 minutes, if the suction pressure falls below the programmed cutout setting, a "transient protection routine" is activated. This sets the cutout at 10% of the programmed value and ramps up the cutout over the next 30 seconds. If at any time during these 30 seconds the suction pressure falls below the ramped cutout, the system will stop.


```
SYS 1 MP/HPCO FAULT
SYS 2 MP/HPCO FAULT
```

```
SYS 1 MP/HPCO INHIB
SYS 2 MP/HPCO INHIB
```

The Motor Protector/Mechanical High Pressure Cutout protects the compressor motor from overheating or the system from experiencing dangerously high discharge pressure.

This fault condition is present when CR1 (SYS 1) or CR2 (SYS 2) relays de-energize due to the HP switch or motor protector opening. This causes the respective CR contacts to open causing 0VDC to be read on the inputs to the microboard. The fault condition is cleared when a 30VDC signal is restored to the input.

The internal motor protector opens at 185°F - 248°F (85°C - 120°C) and auto resets. The mechanical HP switch opens at 405 PSIG +/- 10 PSIG (27.92 barg +/- .69 barg) and closes at 330 PSIG +/- 25 PSIG (22.75 barg +/- 1.72 barg).

The compressor is also equipped with a discharge temperature sensor for the purpose of sensing internal scroll temperature. This sensor protects the scrolls from overheating due to inadequate cooling that may occur when refrigerant charge is low, or superheat is too high.

When the sensor senses a high temperature, it opens the motor protector circuit in the compressor causing the compressor to shut down.

During the first two faults an MP/HP INHIBIT message will be displayed and the system will not be locked out. Only after the third fault in 90 minutes will the MP/HPCO FAULT message be displayed.

Whenever the motor protector or discharge sensor shuts down a compressor and the system, the internal compressor contacts will open for a period of 30 minutes to assure that the motor or scroll temperatures have time to dissipate the heat and cool down.

After 30 minutes, the contacts will close and the system will be permitted to restart. The micro will not try to restart the compressors in a system that shuts down on this safety for a period of 30 minutes to allow the internal compressor to time out.

During the 30 minute timeout, the MP/HPCO INHIB message will be displayed. The MP/HPCO fault will only be displayed after 3 shutdowns in 90 minutes, indicating the system is locked out and will not restart.

```
SYS 1 HIGH MTR CURR
SYS 2 HIGH MTR CURR
```

When the System Current Feedback option is installed and selected (Option 11 under OPTIONS Key Current Feedback), this safety will operate as follows. If the actual feedback voltage of the system proportional to currents exceeds the programmed trip voltage for 5 seconds, the system will shutdown.

```
SYS 1 LOW EVAP TEMP
SYS 2 LOW EVAP TEMP
```

The Low Evaporator Temperature Cutout is to protect the evaporator from freeze-up with R-407C. This safety uses the Cooler Inlet Refrigerant Temp Sensors to monitor evaporator inlet refrigerant temperature on each system and will shut down the system if the cutout is exceeded. These sensors are only installed on R-407C units. This safety is ignored for the first 300 seconds of runtime.

After 5 minutes of run time there is a 5 minute Low Evap Temp Safety Bypass Ramp: anytime the cooler inlet refrigerant temperature drops below the cutout will be lowered 6° F and ramped up to the original value over the next 5 minutes. If the cooler inlet refrigerant temperature rises above the original cutout during the ramp, the cutout will be reset to the original value and the ramp will be ended.

In water cooling mode, the cutout is fixed at 20°F. In glycol cooling mode, the cutout is 15° F below the leaving chilled liquid temperature cutout.

In either cooling mode, if the cooler inlet refrigerant temp. sensor reads out of range low, the system will also shut down.

```
SYS 1 LOW SUPERHEAT
SYS 2 LOW SUPERHEAT
```

The Low Superheat Cutout is to protect the compressor(s) from liquid floodback due to low suction superheat. This safety is only active when EEV is selected as the expansion valve in SERVICE Mode. This safety is ignored for the first 15 seconds of system runtime.

This safety can be triggered by two events. The first is when suction superheat < 2.0°F for 3 seconds. The second is when the EEV pilot solenoid is closed 10 times in 2 minutes due to low superheat.

```
SYS 1 SENSOR FAILURE
SYS 2 SENSOR FAILURE
```

The Sensor Failure Safety prevents the system from running when the sensors measuring superheat are not functioning properly. This safety is only active when EEV is selected as the expansion valve type in SERVICE Mode. This safety is ignored for the first 15 seconds of system runtime.

This safety will shut down a system if either suction temperature or suction pressure sensors read out of range high or low. This condition must be present for 3 seconds to cause a system shutdown. The safety locks out a system after the first fault and will not allow automatic restarting.

Unit Safeties:

Unit safeties are faults that cause all running compressors to be shut down. Unit faults are auto reset faults in that the unit will be allowed to restart automatically after the fault condition is no longer present.

```
UNIT FAULT:
LOW AMBIENT TEMP
```

The Low Ambient Temp Cutout is a safety shutdown designed to protect the chiller from operating in a low ambient condition. If the outdoor ambient temperature falls below the programmable cutout, the chiller will shut down. Restart can occur when temperature rises 2°F above the cutoff.

```
UNIT FAULT:
LOW LIQUID TEMP
```

The Low Leaving Chilled Liquid Temp Cutout protects the chiller form an evaporator freeze-up should the chilled liquid temperature drop below the freeze point. This situation could occur under low flow conditions or if the micro panel setpoint values are improperly programmed. Anytime the leaving chilled liquid temperature (water or glycol) drops below the cutout point, the chiller will shutdown. Restart can occur when chilled liquid temperature rises 2°F above the cutout.

```
UNIT FAULT:
115VAC UNDER VOLTAGE
```

The Under Voltage Safety assures that the system is not operated at voltages where malfunction of the microprocessor could result in system damage. When the 115VAC to the micro panel drops below a certain level, a unit fault is initiated to safely shut down the unit. Restart is allowed after the unit is fully powered again and the anti-recycle timers have finished counting down.

```
UNIT FAULT:
HIGH MTR CURR
```

When the CURRENT FEEDBACK ONE PER UNIT option is selected under the OPTIONS Key, the unit will shut down when the voltage exceeds the programmed trip voltage for 5 seconds.

The trip voltage is programmed at the factory according to compressor or unit RLA.

Restart will occur after the anti-recycle timer times out.

UNIT WARNING

The following messages are not unit safeties and will not be logged to the history buffer. They are *unit warnings* and will not auto-restart. Operator intervention is required to allow a restart of the chiller.

```
!! LOW BATTERY !!
CHECK PROG/SETP/OPTN
```

The Low Battery Warning can only occur at unit power-up. On micro panel power-up, the RTC battery is checked. If a low battery is found, all programmed setpoints, program values, options, time, schedule, and history buffers will be lost. These values will all be reset to their default values which may not be the desired operating values. Once a faulty battery is detected, the unit will be prevented from running until the PROGRAM key is pressed. Once PROGRAM is pressed the anti-recycle timers will be set to the programmed anti-recycle time to allow the operator time to check setpoints, and if necessary, reprogram programmable values and options.

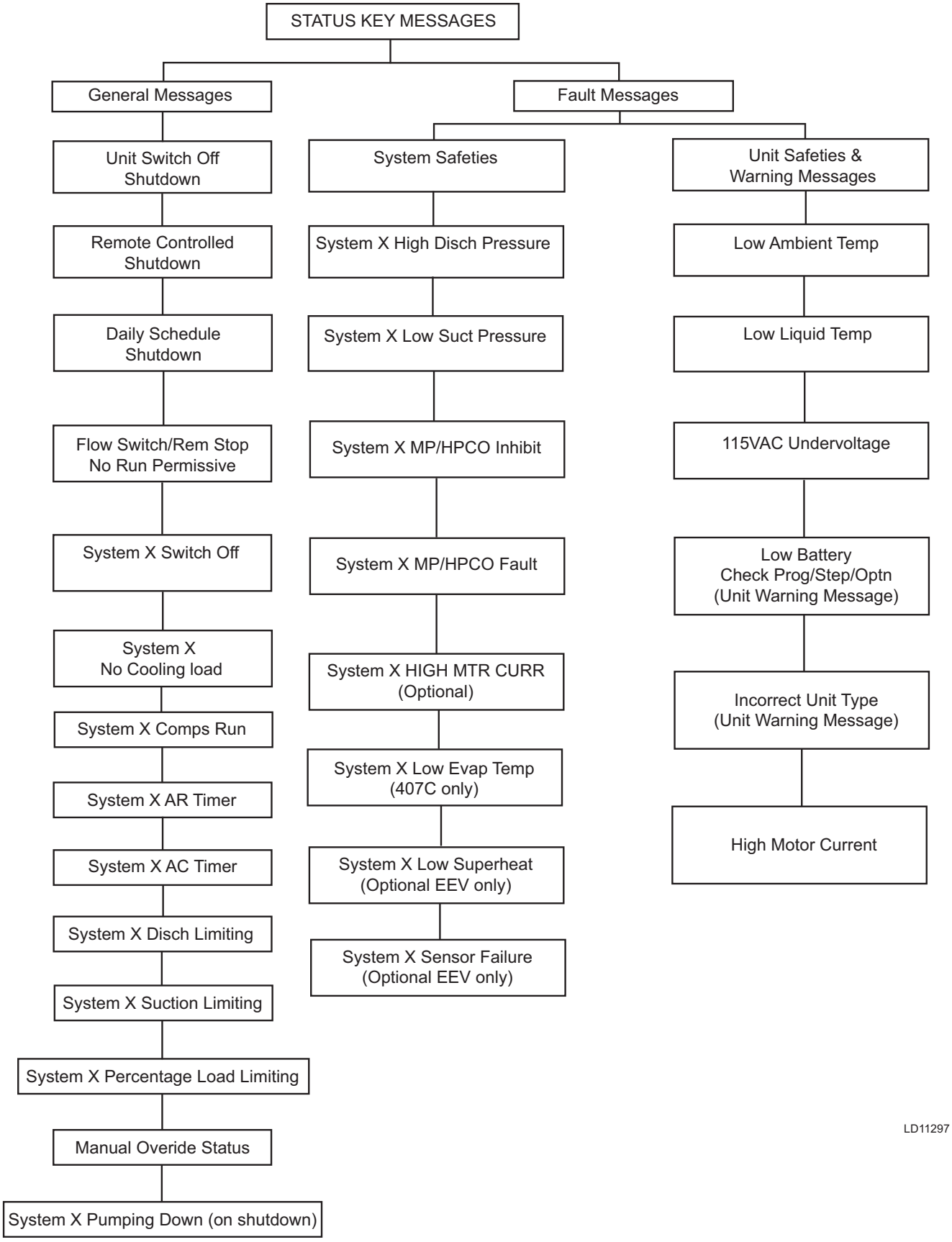
If a low battery is detected, it should be replaced as soon as possible. The programmed values will all be lost and the unit will be prevented from running on the next power interruption. The RTC/battery (031-02565-000) is located at U15 on the IPU microboard (031-02630-000).

```
INCORRECT
UNIT TYPE
```

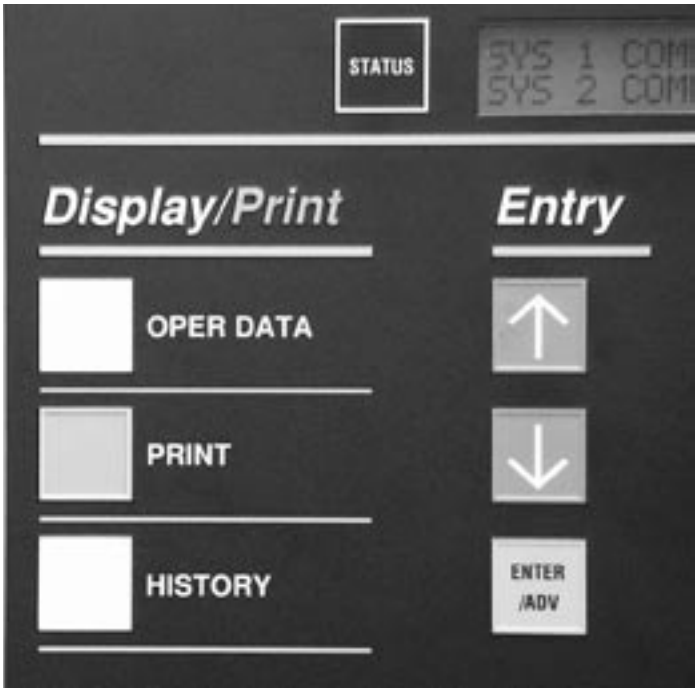
This indicates the condensing unit jumper is installed between J4-11 and J4-6, on a liquid chiller. This jumper must be removed to operate the chiller.

STATUS KEY MESSAGES

TABLE 13 – STATUS KEY MESSAGES QUICK REFERENCE LIST


STATUS KEY MESSAGES
General Messages
Fault Messages
Unit Switch Off Shutdown
Remote Controlled Shutdown
Daily Schedule Shutdown
Flow Switch/Rem Stop No Run Permissive
System X Switch Off
System X No Cooling load
System X Comps Run
System X AR Timer
System X AC Timer
System X Disch Limiting
System X Suction Limiting
System X Percentage Load Limiting
Manual Overide Status
System X Pumping Down (on shutdown)
System Safeties
System X High Disch Pressure
System X Low Suct Pressure
System X MP/HPCO Inhibit
System X MP/HPCO Fault
System X HIGH MTR CURR (Optional)
System X Low Evap Temp (407C only)
System X Low Superheat (Optional EEV only)
System X Sensor Failure (Optional EEV only)
Unit Safeties & Warning Messages
Low Ambient Temp
Low Liquid Temp
115VAC Undervoltage
Low Battery Check Prog/Step/Optn (Unit Warning Message)
Incorrect Unit Type (Unit Warning Message)
High Motor Current
LD11297

DISPLAY/PRINT KEYS



00067VIP

The Display/Print keys allow the user to retrieve system and unit information that is useful for monitoring chiller operation, diagnosing potential problems, troubleshooting, and commissioning the chiller.

System and unit information, unit options, setpoints, and scheduling can also be printed out with the use of a printer. Both real-time and history information are available.

OPER DATA Key

The OPER DATA key gives the user access to unit and system operating parameters. When the OPER DATA key is pressed, system parameters will be displayed and remain on the display until another key is pressed. After pressing the OPER DATA key, the various operating data screens can be scrolled through by using the ↑ (UP) and ↓ (DOWN) arrow keys or the ENTER/ADV key located under the "ENTRY" section.

NOTE

System 2 information will only be displayed for 2 system units.

With the "UNIT TYPE" set as a liquid chiller (via no jumper between J4-11 and J4-6), the following list of operating data screens are viewable under the Oper Data key in the order that they are displayed. The ↓ (DOWN) arrow key scrolls through the displays in the order they appear below:

NOTE

The chiller MUST be set to be a liquid chiller via no jumper between J11-7 and J11-12. DO NOT operate the chiller if not properly set up.

```
LCHLT = 46.2°F
RCHLT = 57.4°F
```

This display shows chilled leaving and return liquid temperatures. The minimum limit on the display for these parameters are 9.2°F (-12.7°C). The maximum limit on the display is 140°F (60°C).

```
AMBIENT AIR TEMP
= 87.5°F
```

This display shows the ambient air temperature. The minimum limit on the display is 0.4°F (-17.6°C). The maximum limit on the display is 131.2°F (55.1°C).

```
SYS X SP = 72.1 PSIG
      DP =227.0 PSIG
```

These displays show suction and discharge pressures for each system. The discharge pressure transducer is optional on some models.

If the *optional* discharge transducer is not installed, the discharge pressure would display 0 PSIG (0 barg).

Some models come factory wired with a low pressure switch in place of the suction transducer. In this case, the suction pressure would only be displayed as the maximum suction pressure reading of >200 PSIG (13.79 barg) when closed, or < 0 PSIG (0 barg) when open.

The minimum limits for the display are:
Suction Pressure: 0 PSIG (0 barg)
Discharge Pressure: 0 PSIG (0 barg)

The maximum limits for the display are:
Suction Pressure: 200 PSIG (13.79 barg)
Discharge Pressure: 400 PSIG (27.58 barg)

```
SYS X SUCT = XXX.X°F
   SAT SUCT = XXX.X°F
```

```
SYS X EEV = XXX.X %
SUCT SHEAT = XXX.X°F
```

These messages will be displayed for each system, if an EEV is installed in the system. The EEV % is the EEV controller output.

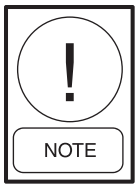
```
SYS X COOLER INLET
REFRIG TEMP=XXX.X°F
```

Cooler inlet temperatures, as measured by the refrigerant temperature sensor in the cooler, will be displayed on R-407c units for both systems.

```
SYS X HOURS 1=XXXXX
      2=XXXXX, 3=XXXXX
```

```
SYS X STARTS 1=XXXXX
      2=XXXXX, 3=XXXXX
```

The above two messages will appear sequentially for each system. The first display shows accumulated running hours of each compressor for the specific system. The second message shows the number of starts for each compressor on each system.



Run times and starts will only be displayed for the actual number of systems and compressors on the unit.

A total of 99,999 hours and starts can be logged before the counter rolls over to “0”.

```
   LOAD TIMER  58 SEC
UNLOAD TIMER   0 SEC
```

This display of the load and unload timers indicate the time in seconds until the unit can load or unload. Whether the systems loads or unloads is determined by how far the actual liquid temperature is from setpoint. A detailed description of unit loading and unloading is covered under the topic of Capacity Control.

```
COOLING DEMAND
2 OF 8 STEPS
```

The display of COOLING DEMAND indicates the current “step” in the capacity control scheme when in Return Water Control Mode. The number of available steps are determined by how many compressors are in the unit. In the above display, the “2” does not mean that two compressor are running but only indicates that the capacity control scheme is on step 2 of 8. Capacity Control is covered in more detail in this publication which provides specific information on compressor staging (for Return Water Control only).

```
TEMP ERROR XXX.X°F
TEMP RATE  XXX.X°F/M
```

The COOLING DEMAND message will be replaced with this message when Leaving Chilled liquid control is selected. This message indicates the temperature error and the rate of change of the chilled liquid temperature.

```
LEAD SYSTEM IS
SYSTEM NUMBER 2
```

This display indicates the current LEAD system. In this example system 2 is the LEAD system, making system 1 the LAG system. The LEAD system can be manually selected or automatic. *Refer to the programming under the “OPTIONS” key.* The Lead System display will only appear on a two system unit.

NOTE

A unit utilizing hot gas bypass should be programmed for MANUAL with system 1 as the lead system. Failure to do so will prevent hot gas operation if system 2 switches to the lead system when programmed for AUTOMATIC LEAD/LAG.

```
EVAP PUMP IS ON
EVAP HEATER IS OFF
```

This display indicates the status of the evaporator pump contacts and the evaporator heater.

The evaporator pump dry contacts are energized when any compressor is running, or the unit is not OFF on the daily schedule and the unit switch is on, or the unit has shutdown on a Low Leaving Chilled Liquid fault. However, even if one of above is true, the pump will not run if the micro panel has been powered up for less than 30 seconds or if the pump has run in the last 30 seconds to prevent pump motor overheating.

The evaporator heater is controlled by ambient air temperature. When the ambient temperature drops below 40°F the heater is turned on. When the temperature rises above 45°F the heater is turned off. An under voltage condition will keep the heater off until full voltage is restored to the system.

```
ACTIVE REMOTE CTRL
NONE
```

There are several types of remote systems that can be used to control or monitor the unit. The following messages indicate the type of remote control mode active:

NONE – no remote control active. Remote monitoring may be via ISN.

ISN – YORK Talk via ISN allows remote load limiting and temperature reset through an ISN system.

*LOAD LIM – load limiting enabled. Can be either stage 1 or stage 2 of limiting.

*PWM TEMP – EMS-PWM temperature reset

*Refer to the section on OPERATING CONTROLS.

If the micro is programmed for CURRENT FEEDBACK ONE PER UNIT under the OPTIONS Key, the display will show up as the first display prior to the SYS 1 displays. Total chiller current is displayed as shown below:

```
UNIT AMPS = 54.0
     VOLTS = 1.2
```

If the micro is programmed for CURRENT FEEDBACK NONE, no current display will appear.

```
SYS X COMP STATUS
1=XXX 2=XXX 3=XXX
```

```
SYS X RUN TIME
XX-XX-XX-XX D-H-M-S
```

```
SYS X LLSV IS ON
HOT GAS SOL IS OFF
```

```
SYS X FAN STAGE 3
```

```
SYS X AMPS = 36.0
     VOLTS = 0.8
```

The preceding five messages will appear sequentially, first for system 1, then for system 2.

The first message indicates the system and the associated compressors which are running.

The second message indicates the system run time in days – hours – minutes – seconds. Please note that this is not accumulated run time but pertains only to the current system cycle.

The third message indicates the system, and whether the liquid line solenoid or EEV pilot solenoid and hot gas solenoid are being turned on by the microboard. Please note that hot gas is not available for system 2, so there is no message pertaining to the hot gas solenoid when a system 2 message is displayed.

The fourth message indicates what stage of condenser fan operation is active. For YCAL0041 to YCAL0071unless a low ambient kit is added, only stages 1 and 3 will be actually used to cycle the condenser fans.

See the section on Condenser Fan Control in the UNIT OPERATION section for more information.

The fifth message displays current as sensed by the optional current feedback circuitry. The display reads out in amps along with the DC feedback voltage from the module. Current is calculated by:

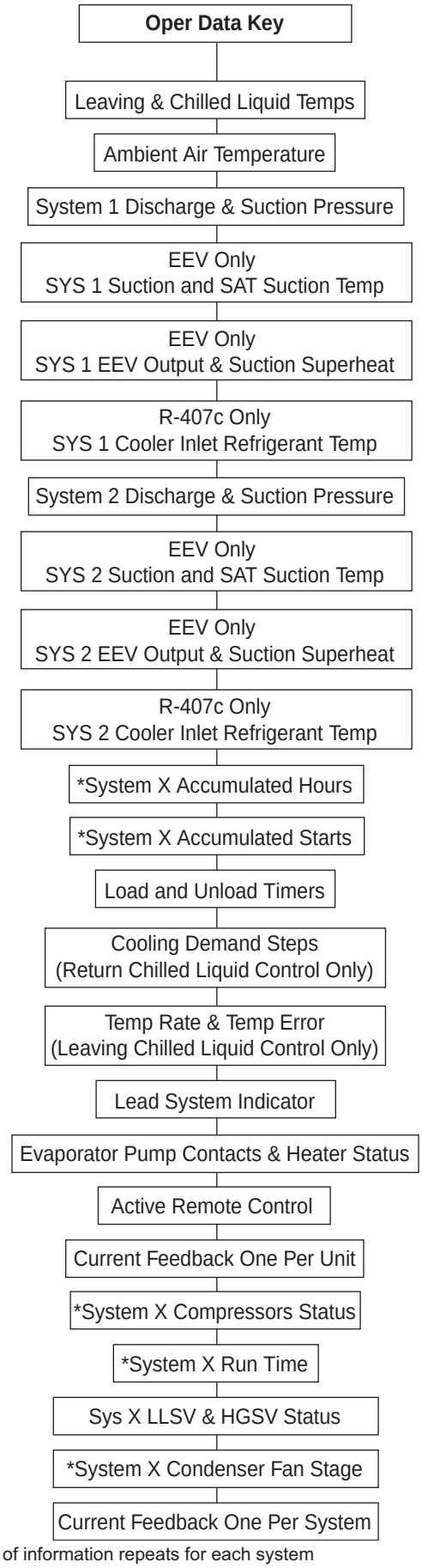
$$\frac{225A \bullet \text{Actual Volts}}{5 \text{ Volts}}$$

Individual displays will be present for each system, if CURRENT FEEDBACK ONE PER SYSTEM is programmed under the OPTIONS Key. Combined compressor current for each system is displayed.

OPER DATA Quick Reference List

The following table is a quick reference list for information available under the OPER DATA key.

TABLE 14 – OPERATION DATA


Oper Data Key
Leaving & Chilled Liquid Temps
Ambient Air Temperature
System 1 Discharge & Suction Pressure
EEV Only
SYS 1 Suction and SAT Suction Temp
EEV Only
SYS 1 EEV Output & Suction Superheat
R-407c Only
SYS 1 Cooler Inlet Refrigerant Temp
System 2 Discharge & Suction Pressure
EEV Only
SYS 2 Suction and SAT Suction Temp
EEV Only
SYS 2 EEV Output & Suction Superheat
R-407c Only
SYS 2 Cooler Inlet Refrigerant Temp
*System X Accumulated Hours
*System X Accumulated Starts
Load and Unload Timers
Cooling Demand Steps
(Return Chilled Liquid Control Only)
Temp Rate & Temp Error
(Leaving Chilled Liquid Control Only)
Lead System Indicator
Evaporator Pump Contacts & Heater Status
Active Remote Control
Current Feedback One Per Unit
*System X Compressors Status
*System X Run Time
Sys X LLSV & HGSV Status
*System X Condenser Fan Stage
Current Feedback One Per System

* Block of information repeats for each system

LD07381

PRINT KEY

The PRINT key allows the operator to obtain a printout of real-time system operating data or a history printout of system data at the "instant of the fault" on the last six faults which occurred on the unit. An optional printer is required for the printout.

OPERATING DATA PRINTOUT

Pressing the PRINT key and then OPER DATA key allows the operator to obtain a printout of current system operating parameters. When the OPER DATA key is pressed, a snapshot will be taken of system operating conditions and panel programming selections. This data will be temporarily stored in memory and transmission of this data will begin to the printer. A sample Operating Data printout is shown below. (Note: Not all values are printed for all models.)

```
   YORK INTERNATIONAL CORPORATION
     MILLENNIUM LIQUID CHILLER

           UNIT STATUS
         2:04PM 01 JAN 08

SYS 1              NO COOLING LOAD
SYS 2       COMPRESSORS RUNNING 2

              OPTIONS
CHILLED LIQUID                WATER
AMBIENT CONTROL            STANDARD
LOCAL/REMOTE MODE            REMOTE
CONTROL MODE         LEAVING LIQUID
LEAD/LAG CONTROL          AUTOMATIC
FAN CONTROL       AMB & DSCH PRESS
CURRENT FEEDBACK               NONE
SOFT START                  ENABLED
EXPANSION VALVE             THERMO-
STATIC

           PROGRAM VALUES
DSCH PRESS CUTOUT          395 PSIG
SUCT PRESS CUTOUT           44 PSIG
LOW AMBIENT CUTOUT            25.0
                              DEGF
LEAVING LIQUID CUTOUT         36.0
                              DEGF
ANTI RECYCLE TIME          600 SECS
FAN CONTROL ON PRESS       240 PSIG
FAN DIFF OFF PRESS          80 PSIG
NUMBER OF COMPRESSORS            6
NUMBER OF FANS PER SYSTEM
    4
UNIT TRIP VOLTS
3.0
REFRIGERANT TYPE               R-22
REMOTE UNIT ID PROGRAMMED         2

              UNIT DATA
RETURN LIQUID TEMP            58.2
                              DEGF
```

```
LEAVING LIQUID TEMP           53.0
                              DEGF
COOLING RANGE   42.0 +/- 2.0 DEGF
AMBIENT AIR TEMP       74.8 DEGF
LEAD SYSTEM                 SYS 2
EVAPORATOR PUMP               ON
EVAPORATOR HEATER            OFF
ACTIVE REMOTE CONTROL       NONE
UNIT  XXX.X AMPS       X.X VOLTS
SOFTWARE VERSION     C.MMC.03.03

          SYSTEM 1 DATA
COMP STATUS   1=OFF 2=OFF 3=OFF
RUN TIME     0- 0- 0- 0 D-H-M-S
SUCTION PRESSURE           66 PSIG
DISCHARGE PRESSURE        219 PSIG
SUCTION TEMPERATURE      52.8 DEGF
SAT SUCTION TEMP         40.0 DEGF
SUCTION SUPERHEAT        12.8 DEGF
COOLER INLET REFRIG      31.6 DEGF
LIQUID LINE SOLENOID          OFF
HOT GAS BYPASS VALVE          OFF
CONDENSER FAN STAGES          OFF
EEV OUTPUT                  0.0 %
SYSTEM     XXX.X AMPS X.X VOLTS

          SYSTEM 2 DATA
COMP STATUS 1=OFF, 2=OFF, 3=OFF
SUCTION PRESSURE           51 PSIG
DISCHARGE PRESSURE        157 PSIG
SUCTION TEMPERATURE      44.3 DEGF
SAT SUCTION TEMP         32.1 DEGF
SUCTION SUPERHEAT        12.2 DEGF
COOLER INLET REFRIG      31.6 DEGF
LIQUID LINE SOLENOID          ON
CONDENSER FAN STAGE            3
EEV OUTPUT                  0.0%
SYSTEM    XXX.X AMPS  X.X VOLTS

          DAILY SCHEDULE
S M T W T F S          *=HOLIDAY
MON START=00:00AM
STOP=00:00AM
TUE START=00:00AM
STOP=00:00AM
WED START=00:00AM
STOP=00:00AM
THU START=00:00AM
STOP=00:00AM
FRI START=00:00AM
STOP=00:00AM
SAT START=00:00AM
STOP=00:00AM
HOL START=00:00AM
STOP=00:00AM
```

See Service And Troubleshooting section for Printer Installation information.

7

HISTORY PRINTOUT

Pressing the PRINT key and then the HISTORY key allows the operator to obtain a printout of information relating to the last 6 Safety Shutdowns which occurred. The information is stored at the instant of the fault, regardless of whether the fault caused a lockout to occur. The information is also not affected by power failures (long-term internal memory battery backup is built into the circuit board) or manual resetting of a fault lock-out.

When the HISTORY key is pressed, a printout is transmitted of all system operating conditions which were stored at the "instant the fault occurred" for each of the 6 Safety Shutdowns buffers. The printout will begin with the most recent fault which occurred. The most recent fault will always be stored as Safety Shutdown No. 1. identically formatted fault information will then be printed for the remaining safety shutdowns.

Information contained in the Safety Shutdown buffers is very important when attempting to troubleshoot a system problem. This data reflects the system conditions at the instant the fault occurred and often reveals other system conditions which actually caused the safety threshold to be exceeded.

The history printout is similar to the operational data printout shown in the previous section. The differences are in the header and the schedule information. The daily schedule is not printed in a history print.

One example history buffer printout is shown following. The data part of the printout will be exactly the same as the operational data print so it is not repeated here. The difference is that the Daily Schedule is not printed in the history print and the header will be as follows.

```
YORK INTERNATIONAL CORPORATION
MILLENNIUM LIQUID CHILLER

SAFETY SHUTDOWN NUMBER 1
SHUTDOWN @ 3:56PM  29 JAN 08

SYS 1   HIGH DSCH PRESS SHUTDOWN
SYS 2                  NO FAULTS
```

HISTORY DISPLAYS

The HISTORY key gives the user access to many unit and system operating parameters at the time of a unit or system safety shutdown. When the HISTORY key is pressed the following message is displayed.

```
DISPLAY SAFETY SHUT-
DOWN NO. 1 (1 TO 6)
```

While this message is displayed, the ↑ (UP) arrow key can be used to select any of the six history buffers. Buffer number 1 is the most recent, and buffer number 6 is the oldest safety shutdown that was saved.

After selecting the shutdown number, pressing the ENTER key displays the following message which shows when the shutdown occurred.

```
SHUTDOWN OCCURRED
03:56 PM 29 JAN 02
```

Pressing the ↓ (DOWN) arrow key repeatedly from the DISPLAY SAFETY SHUTDOWN NO. X displays the software version.

```
SOFTWARE VERSION
C.MMC.04.01
```

The ↑ (UP) and ↓ (DOWN) arrow keys are used to scroll forward and backward through the history buffer to display the shutdown conditions stored at the instant the fault occurred. The ↓ (DOWN) arrow key scrolls through the displays in the order they appear below:

```
UNIT FAULT:
LOW LIQUID TEMP
```

Displays the type of fault that occurred.

```
UNIT TYPE
LIQUID CHILLER
```

Displays the type of chiller; Liquid, Condensing Unit or Heat Pump.

```
CHILLED LIQUID
XXXXX
```

```
AMBIENT CONTROL
XXXXXXXXXX
```

Displays the chilled liquid type; Water or Glycol.

Displays the type of Ambient Control; Standard or Low Ambient.

```
LOCAL/REMOTE MODE
XXXXXXXXX
```

Displays Local or Remote control selection.

```
CONTROL MODE
LEAVING LIQUID
```

Displays the type of chilled liquid control; Leaving or Return.

```
LEAD/LAG CONTROL
XXXXXXXX
```

Displays the type of lead/lag control; Manual System 1, Manual System 2 or Automatic. This is only selectable on 2-system chillers.

```
FAN CONTROL
DISCHARGE PRESSURE
```

Displays the type of fan control; Discharge Pressure or Ambient and Discharge Pressure.

```
MANUAL OVERRIDE MODE
XXXXXXXX
```

Displays whether Manual Override was Enabled or Disabled.

```
CURRENT FEEDBACK
XXXXXXXXXXXXXXX
```

Displays type of Current Feedback utilized.

```
SOFT START
XXXXXXX
```

Displays whether the optional European Soft Start was installed and selected.

```
DISCHARGE PRESSURE
CUTOUT = XXXX PSIG
```

Displays the programmed Discharge Pressure Cutout.

```
SUCTION PRESSURE
CUTOUT = XXXX PSIG
```

```
LOW AMBIENT TEMP
CUTOUT = XXX.X °F
```

Displays the programmed Low Ambient Cutout.

```
LEAVING LIQUID TEMP
CUTOUT = XXX.X °F
```

Displays the Leaving Liquid Temp. Cutout programmed.

```
FAN CONTROL ON
PRESSURE=XXX PSIG
```

Displays the programmed Fan On Pressure.

```
FAN DIFFERENTIAL OFF
PRESSURE=PSIG
```

Displays the programmed Fan Off Differential.

```
SYS 1 TRIP VOLTS
= X.X VOLTS
```

Displays the programmed High Current Trip Voltage.

```
SYS 2 TRIP VOLTS
= X.X VOLTS
```

Displays the programmed High Current Trip Voltage.

```
LCHLT = XXX.X °F
RCHLT = XXX.X °F
```

Displays the Leaving and Return chilled Liquid Temperature at the time of the fault.

```
SETPOINT = XXX.X °F
RANGE = +/- °F
```

Displays the programmed Setpoint and Range, if the chiller is programmed for leaving chilled liquid control.

```
SETPOINT = XXX.X °F
RANGE = +XX.X °F
```

Displays the programmed Setpoint and Range, if the chiller is programmed for return chilled liquid control.

```
AMBIENT AIR TEMP
= XXX.X °F
```

Displays the Ambient Temp. at the time of the fault.

```
LEAD SYSTEM IS
SYSTEM NUMBER X
```

```
EVAP PUMP IS XXX
EVAP HEATER IS XXX
```

Displays status of the Evaporator Pump and Heater at the time of the fault.

```
ACTIVE REMOTE CTRL
        XXXX
```

Displays whether Remote Chiller Control was active when the fault occurred.

```
UNIT ACTUAL AMPS
     =XXX.X AMPS
```

This is only displayed when the Current Feedback Option is one per unit.

```
SYS X COMP STATUS
1=XXX 2=XXX 3=XXX
```

Displays which Compressors were running in the system when the fault occurred.

```
SYS X RUN TIME
XX-XX-XX-XX D-H-M-S
```

Displays the system run time when the fault occurred.

```
SYS X SP = XXXX PSIG
     DP = XXXX PSIG
```

Displays the system Suction and Discharge Pressure of the time of the fault.

```
SYS X SUCT = XXX.X°F
  SAT SUCT = XXX.X°F
```

Displays the System Suction Temp and Saturated Suction Temp when an EEV is installed.

```
SYS X EEV  = XXX.X %
SUCT SHEAT = XXX.X°F
```

Displays the EEV signal % and Suction Superheat when an EEV is installed.

```
SYS X COOLER INLET
REFRIG TEMP=XXX.X°F
```

System Inlet cooler temperature will be displayed only on R-407c units.

```
SYS X LLSV IS XXX
HOT GAS SOL IS XXX
```

Displays whether the System Liquid Line Solenoid or Hot Gas Solenoid was energized at the time of the fault.

```
SYS X FAN STAGE XXX
```

Displays the number of Fan Stages in the system active at the time of the fault.

```
SYS X ACTUAL AMPS
     =XXX.X AMPS
```

Displays the system Amperage (calculated approximately) at the time of the fault.

For this message to appear, CURRENT FEEDBACK ONE PER SYSTEM must be programmed under the options key. If the micro is programmed as one CURRENT FEEDBACK ONE PER UNIT under the program key, the display will be the first display prior to the SYS 1 info. If the micro is programmed for CURRENT FEEDBACK NONE, no current display will appear.

Displays for System 1 starting with SYS X NUMBER OF COMPS RUNNING X through SYS X AMPS = XXX.X VOLTS = X.X will be displayed first, followed by displays for System 2.

Further explanation of the above displays is covered under the STATUS, OPER DATA, COOLING SETPOINTS, PROGRAM, and OPTIONS keys.

SOFTWARE VERSION

The software version may be viewed by first pressing the HISTORY key and then the ↓ (DOWN) arrow key.

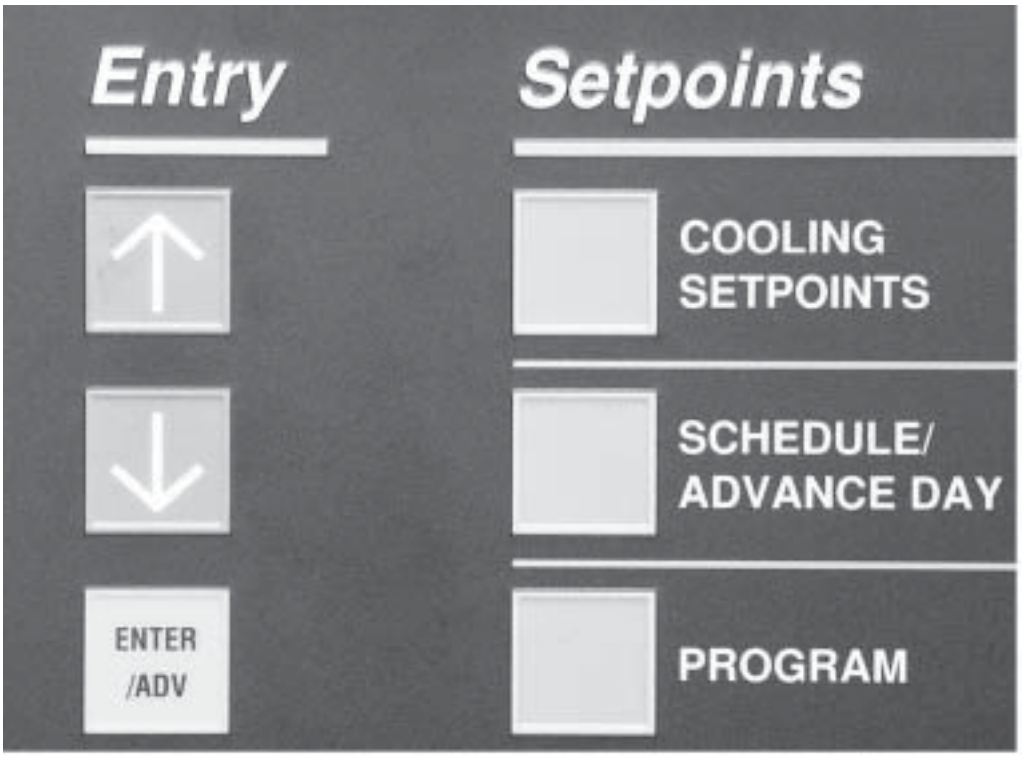
After pressing the HISTORY key, the display safety shutdown message will be displayed.

```
DISPLAY SAFETY SHUT-
DOWN NO.1 (1TO6)
```

After the ↓ (DOWN) arrow key is pressed, the software version will appear.

```
SOFTWARE VERSION
   C.MMC.03.06
```

"ENTRY" KEYS



00068VIP

The Entry Keys allows the user to view, change programmed values. The ENTRY keys consist of an ↑ (UP) arrow key, ↓ (DOWN) arrow key, and an ENTER/ADV key.

UP AND DOWN ARROW KEYS

Used in conjunction with the OPER DATA, HISTORY, COOLING SETPOINTS, SCHEDULE/ADVANCE DAY, OPTIONS and CLOCK keys, the ↑ (UP) and ↓ (DOWN) arrow keys allow the user to scroll through the various data screens. *Refer to the section on "DISPLAY/PRINT" keys for specific information on the displayed information and specific use of the ↑ (UP) and ↓ (DOWN) arrow keys.*

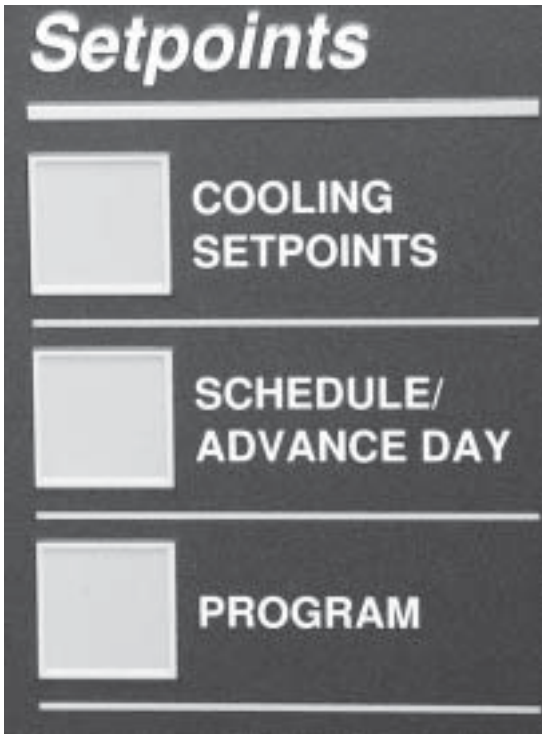
The ↑ (UP) arrow key, and ↓ (DOWN) arrow key are also used for programming the control panel such as changing numerical or text values when programming cooling setpoints, setting the daily schedule, changing safety setpoints, chiller options, and setting the clock.

ENTER/ADV KEY

The ENTER/ADV key must be pushed after any change is made to the cooling setpoints, daily schedule, safety setpoints, chiller options, and the clock. Pressing this key "enters" the new values into memory. If the ENTER/ ADV key is not pressed after a value is changed, the changes will not be "entered" and the original values will be used to control the chiller.

Programming and a description on the use of the ↑ (UP) arrow key, and ↓ (DOWN) arrow, and ENTER/ADV keys are covered in detail under the SETPOINTS, and UNIT keys.

"SETPOINTS" KEYS



00069VIP

Programming of the cooling setpoints, daily schedule, and safeties is accomplished by using the keys located under the SETPOINTS section.

The three keys involved are labeled COOLING SETPOINTS, SCHEDULE/ADVANCE DAY, and PROGRAM.

Following are instructions for programming the respective setpoints. The same instruction should be used to view the setpoints with the exception that the setpoint will not be changed.

COOLING SETPOINTS

The Cooling Setpoint and Range can be programmed by pressing the COOLING SETPOINTS key. The cooling mode (leaving chilled liquid or return chilled liquid) will be displayed for a few seconds, and the setpoint display entry screen will appear.

LEAVING CHILLED LIQUID CONTROL

```
SETPOINT = 45.0°F
 RANGE = +/- 2.0°F
```

The above message shows the current chilled water temperature SETPOINT at 45.0°F (notice the cursor positioned under the number 0). Pressing either the ↑ (UP) or ↓ (DOWN) arrow will change the setpoint in .5°F increments. After using the ↑ (UP) or ↓ (DOWN) arrow keys to adjust to the desired setpoint, the ENTER/ADV key must be pressed to enter this number into memory and advance to the RANGE SETPOINT.

Entry of the setpoint will be indicated by the cursor moving under the current RANGE setpoint. The ↑ (UP) and ↓ (DOWN) arrow keys are used to set the RANGE, in .5 °F increments, to the desired RANGE setpoint. After adjusting the setpoint, the ENTER/ADV key must be pressed to enter the data into memory.

Notice that the RANGE was programmed for +/- X.X° F. This indicates the SETPOINT to be in the *center* of the control range. If the control mode has been programmed for RETURN LIQUID control, the message below would be displayed in place of the previous message.

When in leaving chilled liquid temperature control, the micro will attempt to control the leaving water temperature within the temperature range of the setpoint + or - the range. In the above example, control will be in the range of 43 - 47°F.

RETURN CHILLED LIQUID CONTROL

```
SETPOINT = 45.0 °F
   RANGE = +10.0 °F
```

In return chilled liquid control, the range no longer has a +/- X.X °F, but only a + X.X °F RANGE setpoint. This indicates that the setpoint is not centered within the RANGE but could be described as the bottom of the control range. A listing of the limits and the programmable values for the COOLING SETPOINTS are shown in Table 15.

The SETPOINT and RANGE displays just described were based on LOCAL control. If the unit was programmed for REMOTE control (under the OPTIONS key), the above programmed setpoints would have no effect.

When in return chilled liquid temperature control, the micro will turn all compressors off at setpoint and will turn compressors on as return chilled liquid temperature rises. All compressors will be on at setpoint + the range. If the range equals the temperature drop across the evaporator when fully loaded, the leaving chilled liquid temperature will remain near the setpoint + or - a few degrees as the chiller loads and unloads according to return chilled liquid temperature.

Both LEAVING and RETURN control are described in detail under the section on CAPACITY CONTROL.

REMOTE SETPOINT CONTROL

Pressing the COOLING SETPOINTS key a second time will display the remote setpoint and cooling range. This display automatically updates about every 2 seconds. Notice that these setpoints are not "locally" programmable, but are controlled by a remote device such as an ISN control, remote reset option board, or remote PWM signal. These setpoints would only be valid if the unit was operating in the REMOTE mode.

The following messages illustrate both leaving chilled liquid control and return chilled liquid control respectively.

```
REM SETP = 44.0 °F
  RANGE = +/- 2.0 °F
```

(leaving chilled liquid control)

```
REM SETP = 44.0 °F
   RANGE = +10.0 °F
```

(return chilled liquid control)

The low limit, high limit, and default values for the keys under "SETPOINTS" are listed in Table 15.

Pressing the COOLING SETPOINTS a third time will bring up the display that allows the Maximum EMS-PWM Temperature Reset to be programmed. This message is shown below.

```
MAX EMS-PWM REMOTE
TEMP RESET = +20 °F
```

The Temp Reset value is the maximum allowable reset of the temperature setpoint. The setpoint can be *reset* upwards by the use of a contact closure on the PWM Temp Reset input (CTB1 terminals 13 - 20). The PWM signal may be applied directly on these terminals from an Energy Management System or from the Temperature Reset Option Board. *See page 142 for a detailed explanation of this feature.*

As with the other setpoints, the ↑ (UP) arrow and ↓ (DOWN) arrow keys are used to change the Temp Reset value. After using the ↑ (UP) and ↓ (DOWN) arrows to adjust to the desired setpoint, the ENTER/ADV key must be pressed to enter this number into memory.

SCHEDULE/ADVANCE DAY KEY

The SCHEDULE is a seven day daily schedule that allows one start/stop time per day. The schedule can be programmed Monday through Sunday with an alternate holiday schedule available. If no start/stop times are programmed, the unit will run on demand, providing the chiller is not shut off on a unit or system shutdown. The daily schedule is considered "not programmed" when the times in the schedule are all zeros (00:00 AM).

To set the schedule, press the SCHEDULE/ADVANCE DAY key. The display will immediately show the following display.

```
MON START = 00:00 AM
     STOP = 00:00 AM
```

TABLE 15 – COOLING SETPOINTS, PROGRAMMABLE LIMITS AND DEFAULTS

SETPOINT KEY	MODE	LOW LIMIT	HIGH LIMIT	DEFAULT
LEAVING CHILLED LIQUID SETPOINT	WATER COOLING 4.4°C	40.0°F 21.1°C	**70.0°F 6.7°C	44.0°F
GLYCOL COOLING	*10.0°F -12.2°C	**70.0°F 21.1°C	44.0°F 6.7°C	
LEAVING CHILLED LIQUID CONTROL RANGE	—	1.5°F 0.8°C	2.5°F 1.4°C	2.0°F 1.1°C
RETURNED CHILLED LIQUID SETPOINT	WATER COOLING 4.4°C	40.0°F 21.1°C	70.0°F 6.7°C	44.0°F
GLYCOL COOLING	10.0°F -12.2°C	70.0°F 21.1°C	44.0°F 6.7°C	
RETURN CHILLED LIQUID CONTROL RANGE	—	4.0°F 2.2°C	20.0°F 11.1°C	10.0°F 5.6°C
MAX EMS-PWM REMOTE TEMPERATURE RESET	—	2°F 1.0°C	40°F 22.0°C	20°F 11.0°C

* R*efer to Engineering Guide for operation below 30°F (-1.1°C). Alternate thermal expansion valves must be used below 30°F (-1.1°C).*

* When using glycol, Leaving Chilled Liquid Setpoint should not be set below 20°F (-6.7°C).

** Do not exceed 55°F (12.8°C) setpoint before contacting the nearest YORK Office for application guidelines.

The line under the 0 is the cursor. If the value is wrong, it may be changed by using the ↑ (UP) and ↓ (DOWN) arrow keys until correct. Pressing the ENTER/ADV key will enter the times and then move the cursor to the minute box. The operation is then repeated if necessary. This process may be followed until the hour, minutes, and meridian (AM or PM) of both the START and STOP points are set. After changing the meridian of the stop time, pressing the ENTER/ADV key will advance the schedule to the next day.

Whenever the daily schedule is changed for Monday, all the other days will change to the new Monday schedule. This means if the Monday times are not applicable for the whole week then the exceptional days would need to be reprogrammed to the desired schedule.

To page to a specific day, press the SCHEDULE/ *ADVANCE DAY* key until the desired day appears. The start and stop time of each day may be programmed differently using the ↑ (UP) and ↓ (DOWN) arrow, and ENTER/ADV keys.

After SUN (Sunday) schedule appears on the display a subsequent press of the SCHEDULE/ADVANCE DAY key will display the Holiday schedule. This is a two part display. The first reads:

```
HOL START = 00:00 AM
      STOP = 00:00 AM
```

The times may be set using the same procedure as described above for the days of the week. After changing the meridian of the stop time, pressing the ENTER/ADV key will advance the schedule to the following display:

```
S _ M T W T F S
HOLIDAY NOTED BY *
```

The line below the empty space next to the S is the cursor and will move to the next empty space when the ENTER/ADV key is pressed. To set the Holiday, the cursor is moved to the space following the day of the week of the holiday and the ↑ (UP) arrow key is pressed. An * will appear in the space signifying that day as a holiday. The * can be removed by pressing the ↓ (DOWN) arrow key.

The Holiday schedule must be programmed weekly –once the Holiday schedule runs, it will revert to the normal daily schedule.

PROGRAM KEY

There are several operating parameters under the PROGRAM key that are programmable. These setpoints can be changed by pressing the PROGRAM key, and then the ENTER/ADV key to enter *Program Mode*. Continuing to press the ENTER/ADV key will display each operating parameter. While a particular parameter is being displayed, the ↑ (UP) and ↓ (DOWN) arrow keys can be used to change the value. After the value is changed, the ENTER/ADV key must be pressed to enter the data into memory. Table 16 shows the programmable limits and default values for each operating parameter.

Following are the displays for the programmable values in the order they appear:

```
DISCHARGE PRESSURE
CUTOUT = 395 PSIG
```

DISCHARGE PRESSURE CUTOUT is the discharge pressure at which the system will shutdown as monitored by the *optional* discharge transducer. This is a software shutdown that acts as a backup for the mechanical high pressure switch located in the refrigerant circuit. The system can restart when the discharge pressure drops 40 PSIG (2.76 BARG) below the cutout point.

If the optional discharge pressure transducer is not installed, this programmable safety would not apply. It should be noted that every system has a *mechanical* high pressure cutout that protects against excessive high discharge pressure regardless of whether or not the optional discharge pressure is installed.

```
SUCTION PRESSURE
CUTOUT = 44.0 PSIG
```

The SUCTION PRESSURE CUTOUT protects the chiller from an evaporator freeze-up. If the suction pressure drops below the cutout point, the system will shut down. Typically, the cutout should be set to 44 PSIG (3.03 Bars) form water cooling.

There are some exceptions when the suction pressure is permitted to temporarily drop below the cutout point. Details are explained under the topic of SYSTEM SAFETIES.

```
LOW AMBIENT TEMP
CUTOUT = 25.0°F
```

The LOW AMBIENT TEMP CUTOUT allows the user to select the chiller outside ambient temperature cutout point. If the ambient falls below this point, the chiller will shut down. Restart can occur when temperature rises 2°F (1.11°C) above the cutout setpoint.

```
LEAVING LIQUID TEMP
CUTOUT = 36.0°F
```

The LEAVING LIQUID TEMP CUTOUT protects the chiller from an evaporator freeze-up. Anytime the leaving chilled liquid temperature drops to the cutout point, the chiller shuts down. Restart will be permitted when the leaving chilled liquid temperature rises 2°F (1.11°C) above the cutout setpoint.

When water cooling mode is programmed (OPTIONS key), the value is fixed at 36.0°F (2.22°C) and cannot be changed. Glycol cooling mode can be programmed to values listed in Table 16.

```
ANTI RECYCLE TIMER
= 600 SEC
```

The programmable anti-recycle timer assures that systems do not short cycle, and the compressor motors have sufficient time to dissipate heat after a start. This timer is programmable under the PROGRAM key between 300 - 600 seconds. Whenever possible, to reduce cycling and motor heating, the anti-recycle timer should be adjusted as high as possible. The programmable anti-recycle timer starts the timer when the first compressor in a system starts. The timer begins to count down. If all the compressors in the circuit cycle off, a compressor within the circuit will not be permitted to start until the anti-recycle timer has timed out. If the lead system has run for less than 5 minutes, 3 times in a row, the anti-recycle timer will be extended to 10 minutes, if currently programmed for < 10 minutes.

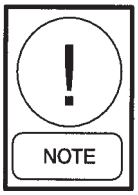
```
FAN CONTROL ON
PRESSURE = XXX PSIG
```

The Fan Control On-Pressure is the programmed pressure value that is used to stage the condenser fans on, in relation to discharge pressure. *Refer to Condenser Fan Control in the UNIT OPERATION section and Tables 22, 23, and 24.*

The microprocessor will not allow programming the "FAN CONTROL ON PRESSURE" minus the "FAN CONTROL DIFFERENTIAL OFF PRESSURE" below 160PSIG. This assures discharge pressure does not drop too low.

```
FAN DIFFERENTIAL OFF
PRESSURE = XXX PSIG
```

The Fan Differential Off Pressure is the programmed differential pressure value that is used to stage the condenser fans off, in relation to discharge pressure. *Refer to Condenser Fan Control in the UNIT OPERATION section and Tables 22, 23, and 24.*



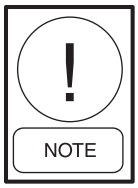
The microprocessor will not allow programming the "FAN CONTROL ON PRESSURE" minus the "FAN CONTROL DIFFERENTIAL OFF PRESSURE" below 160 PSIG. This assures discharge pressure does not drop too low.

```
TOTAL NUMBER OF
COMPRESSORS = 6
```

The TOTAL NUMBER OF COMPRESSORS is the total quantity of compressors in the chiller, and determines the stages of cooling available. Note in Table 16, the chiller may have single or dual systems.

This MUST be programmed correctly to assure proper chiller operation.

A single system chiller MUST have a jumper between terminals 13 - 17 on terminal block CTB1. If the jumper is not installed, the unit will act as a 2-system chiller. The jumper is only checked by the micro at unit power-up. If the jumper is removed, power must be removed and re-applied to register the change in memory.



This MUST be programmed correctly to assure proper chiller operation.

```
SYS X TRIP VOLTS
        =X.X VOLTS
```

```
UNIT TRIP VOLTS
       =X.X VOLTS
```

Depending on the option, the trip voltage for a specific system or unit high current trip can be programmed. It also calibrates the current readout under the OPER DATA key. The approximate programmed value is calculated using the following formulas:

SYSTEM TRIP VOLTS

For individual system high current trip programming on chillers:

- Add the sum of the compressor and fan RLA's in the system
- Multiply the sum by 1.25
- Divide by 225A
- The resulting voltage is the value that should be programmed

For example, if fan and compressor RLA's total 100A:

$$\frac{5V \times 100A}{225A} \times 1.25 = \frac{625VA}{225A} = 2.8V$$

The programmed value will be 2.8V. A similar calculation and programming will be necessary for the other system in a 2-system chiller.

UNIT TRIP VOLTS

For total chiller high current trip programming on 460VAC chillers:

- Add the sum of all the compressor and fan RLA's in the chiller.
- Multiply the sum by 1.25
- Divide by 225A
- The resulting voltage is the value that should be programmed.

For example, if fan and compressor RLA's total 180A:

$$\frac{5V \times 180A}{225A} \times 1.25 = \frac{1125VA}{225A} = 5.0V$$

The programmed value will be 5.0V.

```
REMOTE UNIT ID
PROGRAMMED = X
```

When communications is required with a BAS or OptiView Panel, individual unit IDs are necessary for communications with specific chillers on a single RS-485 line. ID 0-7 is selectable.

```
SYS 1 SUCT SUPERHEAT
SETPOINT = XX.X°F
```

```
SYS 2 SUCT SUPERHEAT
SETPOINT = XX.X°F
```

These messages only appear and are programmable when EEV is selected as the expansion valve type in the Service Mode. EEV must only be selected when an EEV is installed. Superheat is programmable between 10°F - 15°F. A setpoint of 12°F - 15°F is recommended.

TABLE 16 – PROGRAM KEY LIMITS AND DEFAULTS

PROGRAM VALUE	MODE	LOW LIMIT	HIGH LIMIT	DEFAULT
DISCHARGE PRESSURE CUTOUT	—	200 PSIG	399 PSIG	395 PSIG
	13.8 BARG	27.5 BARG	27.2 BARG	
SUCTION PRESSURE CUTOUT GLYCOL COOLING	WATER COOLING 3.03 BARG	44.0 PSIG	70.0 PSIG	44.0 PSIG
		4.83 BARG	3.03 BARG	
	20.0 PSIG 1.38 BARG	70.0 PSIG	44.0 PSIG	
		4.83 BARG	3.03 BARG	
LOW AMBIENT TEMP. CUTOUT LOW AMBIENT	STANDARD AMBIENT -3.9°C	25.0°F	60.0°F	25.0°F
		15.6°C	-3.9°C	
	0°F -17.8°C	60.0°F	25.0°F	
		15.6°C	-3.9°C	
LEAVING CHILLED LIQUID TEMP. CUTOUT	WATER COOLING	—	—	36°F
			2.2°C	
	GLYCOL COOLING -13.3°C	8.0°F	36.0°F	36.0°F
		2.2°C	2.2°C	
ANTI-RECYCLE TIMER	—	300 SEC.	600 SEC.	600 SEC.
FAN CONTROL ON PRESSURE	—	225 PSIG	260 PSIG	240 PSIG
	15.5 BARG	17.9 BARG	16.5 BARG	
FAN DIFFERENTIAL OFF PRESSURE	—	50 PSIG	100 PSID*	80 PSID
		3.45 BARG	6.89 BARG*	5.52 BARG
TOTAL NUMBER OF COMPRESSORS	SINGLE SYSTEM	2	3	3
TWO SYSTEMS	4	6	6	
NUMBER OF FANS PER SYSTEM YCAL0124 ONLY	YCAL0090 –	3	4	3
CURRENT FEEDBACK UNIT/SYSTEM TRIP VOLTS ONE PER UNIT	OPTION ENABLED	0.5	4.5	2
REMOTE UNIT ID	—	0	7	0
SYSTEM 1 SUPERHEAT SETPOINT	EEV 5.5°C	10.0°F	15.0°F	12.0°F
		8.3°C	6.6°C	
SYSTEM 2 SUPERHEAT SETPOINT	EEV 5.5°C	10.0°F	15.0°F	12.0°F
		8.3°C	6.6°C	

* The minimum discharge pressure allowed is 160 PSIG. The fan differential Off Pressure will be lowered to prevent going below 160 PSIG based on where the fan control On Pressure is programmed.

TABLE 17 – SETPOINTS QUICK REFERENCE LIST

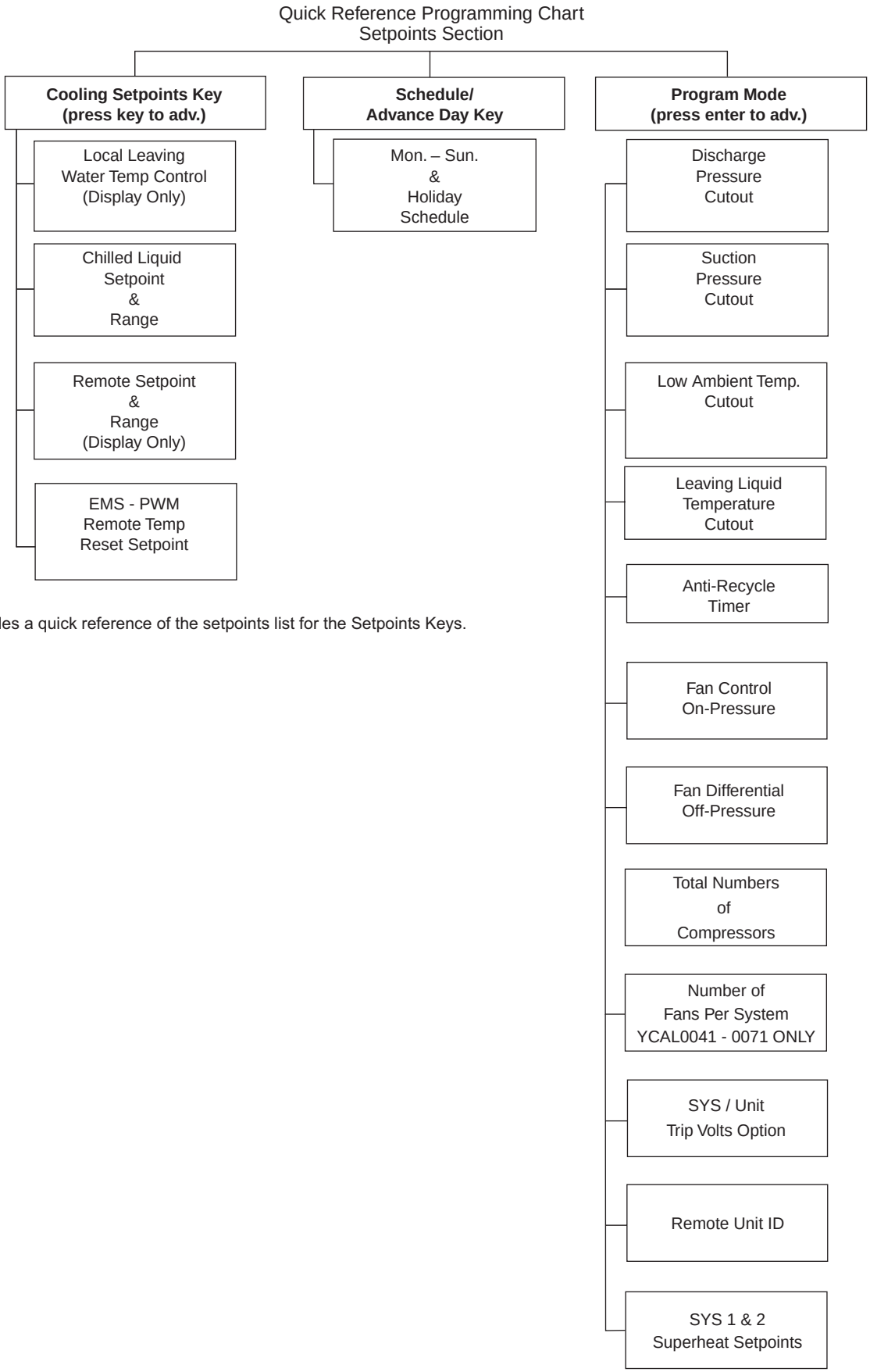

Quick Reference Programming Chart
Setpoints Section
Cooling Setpoints Key (press key to adv.)
Schedule/ Advance Day Key
Program Mode (press enter to adv.)
Local Leaving Water Temp Control (Display Only)
Chilled Liquid Setpoint & Range
Remote Setpoint & Range (Display Only)
EMS - PWM Remote Temp Reset Setpoint
Mon. – Sun. & Holiday Schedule
Discharge Pressure Cutout
Suction Pressure Cutout
Low Ambient Temp. Cutout
Leaving Liquid Temperature Cutout
Anti-Recycle Timer
Fan Control On-Pressure
Fan Differential Off-Pressure
Total Numbers of Compressors
Number of Fans Per System YCAL0041 - 0071 ONLY
SYS / Unit Trip Volts Option
Remote Unit ID
SYS 1 & 2 Superheat Setpoints
LD07404A

Table 17 provides a quick reference of the setpoints list for the Setpoints Keys.

7

"UNIT" KEYS

00070VIP

OPTIONS KEY

There are many user programmable options under the OPTIONS key. The OPTIONS key is used to scroll through the list of options by repeatedly pressing the OPTIONS key . After the selected option has been displayed, the ↑ (UP) and ↓ (DOWN) arrow keys are then used to change that particular option. After the option is changed, the ENTER/ADV key must be pressed to enter the data into memory. Table 18 shows the programmable options. Following are the displays in the order they appear:

Option 1 – Language:

```
DISPLAY LANGUAGE
ENGLISH
```

English, Spanish, French, German, and Italian can be programmed.

Option 2 – System Switches: (two system units only)

(Single System Display is similar)

```
SYS 1 SWITCH ON
SYS 2 SWITCH ON
```

This allows both systems to run

or

```
SYS 1 SWITCH ON
SYS 2 SWITCH OFF
```

This turns system 2 off

```
SYS 1 SWITCH OFF
SYS 2 SWITCH ON
```

This turns system 1 off

or

```
SYS 1 SWITCH OFF
SYS 2 SWITCH OFF
```

This turns systems 1 & 2 off

Turning a system off with its system switch allows a pumpdown to be performed prior to shutdown.

Option 3 – Chilled Liquid Cooling Type:

```
CHILLED LIQUID
WATER
```

The chilled liquid is water. The Cooling Setpoint can be programmed from 40°F to 70°F (4.4°C to 21.1°C)

or

```
CHILLED LIQUID
GLYCOL
```

The chilled liquid is glycol. The Cooling Setpoint can be programmed from 10°F to 70°F (-12.2°C to 21.1°C).

Option 4 – Ambient Control Type:

```
AMBIENT CONTROL
STANDARD
```

The low ambient cutout is adjustable from 25°F to 60°F (-3.9°C to 15.6°C).

or

```
AMBIENT CONTROL
LOW AMBIENT
```

The low ambient cutout is programmable down to 0°F (-17.8°C). **A low ambient kit MUST be installed for this option to be chosen. If the kit is NOT installed, and low ambient is selected, low pressure faults and compressor damage may occur.**

Option 5 – Local/Remote Control Type:

```
LOCAL / REMOTE MODEL
LOCAL
```

When programmed for LOCAL, an ISN or RCC control can be used to monitor only. The micro panel will operate on locally programmed values and ignore all commands from remote devices, or through the RS-485 inputs. The chiller will communicate and send data to the remote monitoring devices.

or

```
LOCAL/REMOTE MODE
REMOTE
```

This mode should be selected when an ISN or RCC control is to be used to control the chiller. This mode will allow the ISN to control the following items: Remote Start/Stop, Cooling Setpoint, Load Limit, and History Buffer Request. If the unit receives no valid ISN transmission for 5 minutes, it will revert back to the locally programmed values.

Option 6 – Unit Control Mode:

```
CONTROL MODE
RETURN LIQUID
```

Unit control is based on return chilled liquid temp. Return Chilled Liquid Control can only be selected on units that have 4 to 6 compressors (dual system units).

or

```
CONTROL MODE
LEAVING LIQUID
```

Option 7 – Display Units:

```
DISPLAY UNITS
IMPERIAL
```

This mode displays system operating values in Imperial units of °F or PSIG.

or

```
DISPLAY UNITS
SI
```

This mode displays system operating values in Scientific International Units of °C or BARG.

Option 8 – Lead/Lag Type (two system units only):

```
LEAD/LAG CONTROL
MANUAL SYS 1 LEAD
```

SYS 1 selected as lead compressor. SYS 1 lead option MUST be chosen if Hot Gas Bypass is installed.

or

```
LEAD/LAG CONTROL
MANUAL SYS 2 LEAD
```

SYS 2 selected as lead compressor.

or

```
LEAD/LAG CONTROL
AUTOMATIC
```

Lead/lag between systems may be selected to help equalize average run hours between systems on chillers with 2 refrigerant systems. Auto lead/lag allows automatic lead/lag of the two systems based on an average run hours of the compressors in each system. A new lead/lag assignment is made whenever all compressors shut down. The micro will then assign the “lead” to the system with the shortest average run time.

Option 9 – Condenser Fan Control Mode:

```
FAN CONTROL
DISCHARGE PRESSURE
```

Condenser fans are controlled by discharge pressure only. This mode may only be chosen when discharge pressure transducers are installed.

or

```
FAN CONTROL
AMBIENT & DSCH PRESS
```

Condenser fans are controlled by ambient temperature and discharge pressure. This mode must be chosen if the discharge pressure transducers are **not** installed.

Option 10 – Manual Override Mode:

```
MANUAL OVERRIDE MODE
DISABLED
```

This option allows overriding of the daily schedule that is programmed. MANUAL OVERRIDE MODE – DISABLED indicates that override mode has no effect.

or

```
MANUAL OVERRIDE MODE
ENABLED
```

Manual Override Mode is enabled. This is a service function and when enabled, will allow the unit to start when shut down on the daily schedule. It will automatically be disabled after 30 minutes.

Option 11 – Current Feedback Options Installed:

```
CURRENT FEEDBACK
NONE
```

This mode should be selected when the panel is not equipped with current sensing capability.

or

```
CURRENT FEEDBACK
ONE PER UNIT
```

This mode should be selected when an optional 2ACE Module is installed to allow combined current monitoring of all systems by sensing current on the incoming line. Current input is to J8-5 of the micro.

or

```
CURRENT FEEDBACK
ONE PER SYSTEM
```

This mode should be selected when an optional 2ACE module is installed to allow individual current monitoring of each system. SYS 1 input is to J8-5 of the micro. SYS 2 input is to J8-6 of the micro.

Option 12 – Power Fail Restart:

```
POWER FAIL RESTART
AUTOMATIC
```

Chiller auto restarts after a power failure.

```
POWER FAIL RESTART
MANUAL
```

After a power failure, the UNIT switch must be toggled before restart at the unit is allowed. NORMALLY MANUAL RESTART should NOT BE SELECTED.

Option 13 – Soft Start Enable/Disable:

```
SOFT START
DISABLED
```

SOFT START "DISABLED" MUST be selected on all chillers.
This message may not be viewable on non-European chillers.

Option 14 – Unit Type:

```
UNIT TYPE
LIQUID CHILLER
```

The UNIT TYPE message cannot be modified under the unit keys.

"LIQUID CHILLER" must be displayed, or damage to compressors or other components will occur if operated in the HEAT PUMP or CONDENSING UNIT modes.

If unit type needs to be changed to make the unit a liquid chiller, remove power and then remove the jumper between J11-7 and J11-12. Reapply power to the micropanel and the microprocessor will store the change.

Option 15 – Refrigerant Type:

```
REFRIGERANT TYPE
R-22
```

Refrigerant type R-22 or R-410A may be selected under Service Mode. Refrigerant type is displayed under the Options Key, but is only programmable in Service Mode.

Incorrect programming may cause damage to compressors.

Option 16 – Expansion Valve Type:

```
EXPANSION VALVE TYPE
      THERMOSTATIC
```

Expansion valve type, thermostatic or electronic may be selected under Service Mode. Expansion valve type is displayed under the Options key, but is only programmable in Service Mode. YCAL 0041 – 0071 chillers will typically always be equipped with thermostatic expansion valves.

Incorrect programming may cause damage to compressors.

Also see the UNIT KEYS PROGRAMMING QUICK REFERENCE LIST in Table 18.

Option 17 – Flash Card Update:

```
FLASH CARD UPDATE
      DISABLED
```

A Flash Card is used to input the operating program into the chiller IPU. A Flash Card is used instead of an EPROM. Normally, a Flash Card update is not required and the message above will be displayed.

If the operating software is to be updated, insert the Flash Card into the Flash Card input port. Turn off the unit switch and set the FLASH CARD UPDATE TO "ENABLED" using the ↑ and ↓ keys.

```
FLASH CARD UPDATE
      ENABLED
```

Press the ENTER key and the following message will be displayed until the update has been completed. The keypad and display will not respond during the update. DO NOT reset or power down the chiller until the update is completed.

```
FLASH CARD UPDATING
PLEASE WAIT...
```

After the update is completed, an automatic reboot will occur. If an error occurred, the following message will appear with the error code and no reboot will occur:

```
FLASH CARD UPDATE
ERROR                XXXXX
```

If the update resulted in an error, the original program will still be active. When an error occurs, assure the correct Flash Card was utilized. Incorrect chiller software will cause an error. If this is not the case, the Flash Card is most likely defective or the IPU and I/O combo board is bad.

Option 18 – Remote Temperature Reset:

```
REMOTE TEMP RESET
INPUT          XXXXXXXXXXXXX
```

Remote Temp Reset input selection is programmable according to the type of input utilized. The following options are available:

- DISABLED (default)
- 0.0 – 10.0V (DC)
- 2.0 – 10.0V (DC)
- 0.0 – 20.0 mA
- 4.0 – 20.0 mA

The options display message for Remote Temp Reset Input only appears if the Temp reset Option is enabled under Service Mode.

Option 19 – Pump Control:

Pump Control is utilized to operate the optional onboard pump kit or to control an external pump through dry contacts 23 and 24. To use this option, the following selection should be made in the Service Mode:

```
        YORK  HYDRO
KIT  PUMPS                  =1
```

When YORK HYDRO KIT PUMPS = 1, the controls will be closed to run the pumps whenever any one of the following conditions are true:

- Low Leaving Chilled Liquid Fault
- Any compressor is running
- Daily Schedule is ON and Remote Stop is closed.

Even if one of the above conditions are true, the pump will not run if the chiller has been powered up for less than 30 seconds; or if the pump has run in the last 30 seconds to prevent pump overheating.

```
        EXTERNAL
       EVAP  PUMP
```

EXTERNAL EVAP PUMP should be selected if an external pump is being controlled with the chiller pump contacts. The operation will be the same as YORK HDRO KIT PUMPS = 1

The following option should not be selected.

```
        YORK  HYDRO
KIT  PUMPS                  =2
```

Option 20 – Pump Selection:

The displays for this PUMP SELECTION option should only appear if "YORK HYDRO KIT PUMPS = 2" are selected under Option 19.

```
        PUMP  SELECTION
       MANUAL  PUMP  NO1
```

Selecting Manual Pump 1 allows pump 1 to operate as the duty pump without automatic change over to pump 2.

```
        PUMP  SELECTION
       MANUAL  PUMP  NO2
```

Selecting Manual Pump 2 allows pump 2 to operate as the duty pump without automatic change over to pump 1.

```
        PUMP  SELECTION
          AUTOMATIC
```

Selecting Automatic allows both pumps to operate as the duty pump with automatic change over to standby, if a pump trip occurs.

CLOCK

The CLOCK display shows the current day, time, and date. Pressing the CLOCK key will show the current day, time, and date.

It is important that the date and time be correct, otherwise the daily schedule will not function as desired if programmed. In addition, for ease of troubleshooting via the History printouts, the day, time, and date should be correct.

To change the day, time, and date press the CLOCK key. The display will show something similar to the following:

```
TODAY  IS  FRI  08:51AM
        25  JAN  02
```

The line under the F is the cursor. If the day is correct, press the ENTER/ADV key. The cursor will move under the 0 in 08 hours. If the day is incorrect, press the ↑ (UP) or ↓ (DOWN) arrow keys until the desired day is displayed and then press the ENTER/ADV key at which time the day will be accepted and the cursor will move under the first digit of the "2 digit hour". In a similar manner, the hour, minute, meridian, month, day, and year may be programmed, whenever the cursor is under the first letter/numeral of the item. Press the ↑ (UP) or ↓ (DOWN) arrow keys until the desired hour, minute, meridian; day, month, and year are displayed. Pressing the ENTER/ADV Key will save the valve and move the cursor on to the next programmable variable.

TABLE 18 – UNIT KEYS PROGRAMMING QUICK REFERENCE LIST

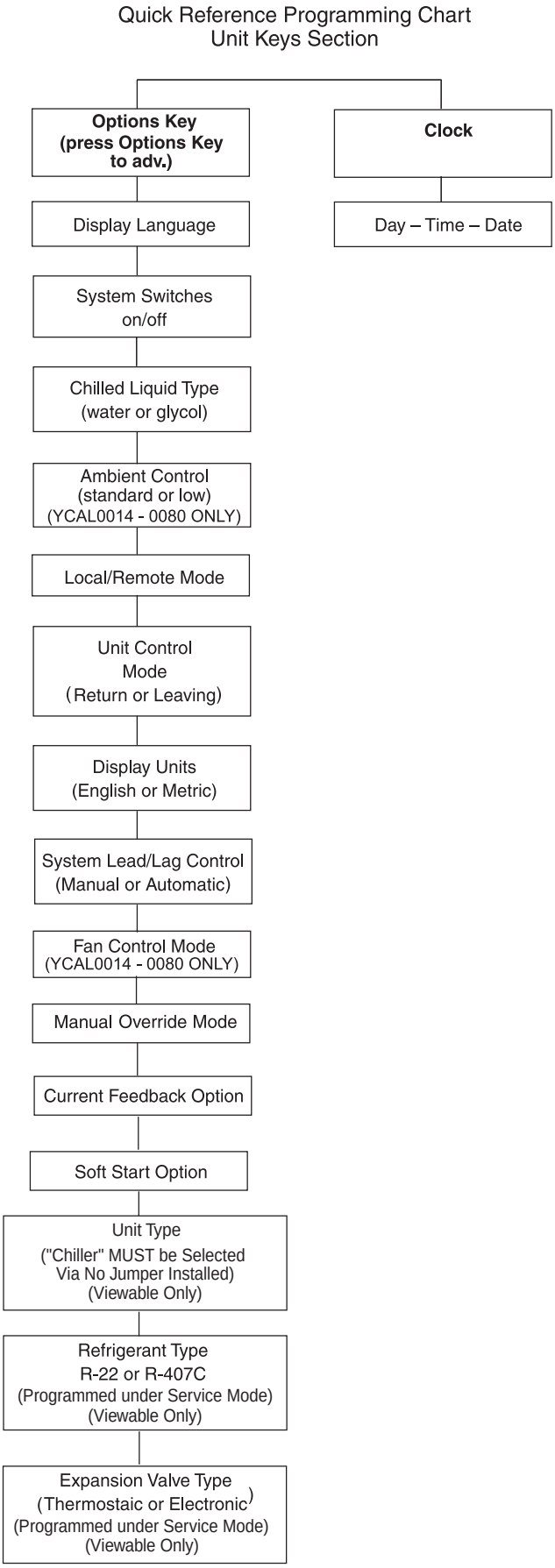

Quick Reference Programming Chart
Unit Keys Section
Options Key (press Options Key to adv.)
Clock
Display Language
Day – Time – Date
System Switches on/off
Chilled Liquid Type (water or glycol)
Ambient Control (standard or low) (YCAL0014 - 0080 ONLY)
Local/Remote Mode
Unit Control Mode (Return or Leaving)
Display Units (English or Metric)
System Lead/Lag Control (Manual or Automatic)
Fan Control Mode (YCAL0014 - 0080 ONLY)
Manual Override Mode
Current Feedback Option
Soft Start Option
Unit Type ("Chiller" MUST be Selected Via No Jumper Installed) (Viewable Only)
Refrigerant Type R-22 or R-407C (Programmed under Service Mode) (Viewable Only)
Expansion Valve Type (Thermostaic or Electronic) (Programmed under Service Mode) (Viewable Only)

Table 18 provides a quick reference list for the Unit key setpoints.

LD07405

SECTION 8 - UNIT OPERATION

CAPACITY CONTROL

To initiate the start sequence of the chiller, all run permissive inputs must be satisfied (flow/remote start/stop switch), and no chiller or system faults exist.

The first phase of the start sequence is initiated by the Daily Schedule Start or any Remote Cycling Device. If the unit is shut down on the daily schedule, the chilled water pump microboard contacts (TB5 3-4) will close to start the pump when the daily schedule start time has been reached. Once flow has been established and the flow switch closes, capacity control functions are initiated, if the remote cycling contacts wired in series with the flow switch are closed.

It should be noted that the chilled water pump contacts (TB5 3-4) are not required to be used to cycle the chilled water pump. However, in all cases the flow switch must be closed to allow unit operation.

The control system will evaluate the need for cooling by comparing the actual leaving or return chilled liquid temperature to the desired setpoint, and regulate the leaving or return chilled liquid temperature to meet that desired setpoint.

SUCTION PRESSURE LIMIT CONTROLS

The anticipatory controls are intended to prevent the unit from ever actually reaching a low-pressure cutout. Loading is prevented, if the suction pressure drops below 1.15 x suction pressure cutout. Load may reoccur after suction pressure rises above the unload point and a period of one minute elapses. This control is only operable if the optional suction pressure transducers are installed.

DISCHARGE PRESSURE LIMIT CONTROLS

The discharge pressure limit controls unload a system before it reaches a safety limit due to high load or dirty condenser coils. The micro monitors discharge pressure and unloads a system, if fully loaded, by one compressor when discharge pressure exceeds the programmed cutout minus 15 PSIG. Reloading will occur when the discharge pressure on the affected system drops to 85% of the unload pressure and 10 minutes have elapsed.

This control is only applicable if optional discharge pressure transducers are installed.

LEAVING CHILLED LIQUID CONTROL

The setpoint, when programmed for Leaving Chilled Liquid Control, is the temperature the unit will control to within +/- the (control) cooling range. The Setpoint High Limit is the Setpoint plus the Cooling Range. The Setpoint Low Limit is the Setpoint minus the Cooling Range. Fig. 13 should be utilized to aid in understanding the following description of Leaving Chilled Liquid Control.

If the leaving chilled liquid temperature is above the Setpoint High Limit, the lead compressor on the lead system will be energized along with the liquid line solenoid. Upon energizing any compressor, the 60 second Anti-Coincidence timer will be initiated to prevent multiple compressors from turning on.

If after 60 seconds of run-time the leaving chilled liquid temperature is still above the Setpoint High Limit, the next compressor in sequence will be energized. Additional compressors will be energized at a rate of once every 60 seconds if the chilled liquid temperature remains above the Setpoint High Limit and the chilled liquid temperature is dropping less than 3°F/min. The lag system will not be allowed to start a compressor until the lead system has run for 5 minutes.

If the chilled liquid temperature falls below the Setpoint High Limit but is greater than the Setpoint Low Limit, loading and unloading do not occur. This area of control is called the control range.

If the chilled liquid temperature drops to between Setpoint Low Limit and 0.5°F (.28°C) below the Setpoint Low Limit, unloading (a compressor turns off) occurs at a rate of 1 every 60 seconds. If the chilled liquid temperature falls to a value greater than 0.5°F (.28°C) below the Setpoint Low Limit but not greater than 1.5°F (.83°C) below the Setpoint Low Limit, unloading occurs at a rate of 30 seconds. If the chilled liquid temperature falls to a value greater than 1.5°F (.83°C) below the Setpoint Low Limit, unloading occurs at a rate of 20 seconds. If the chilled liquid temperature falls below 1°F above the low chilled liquid temperature cutout, unloading occurs at a rate of 10 seconds.

In water cooling mode on R-407C chillers, the minimum low limit of the control range will be 40.0ºF. For leaving chilled liquid temperature setpoint and control range combinations that result in the low limit of the control range being below 40.0ºF, the low limit will be reset to 40.0ºF and the difference will be added to the high limit. This will result in a control range the same size as programmed but not allow the unit to run below 40.0ºF. This control will not affect glycol chillers.

Hot gas, if present, will be the final step of capacity. Hot gas is energized when only a single compressor is running and LWT<SP. Hot gas is turned off as temperature rises when LWT>SP + CR/2. If temperature remains below

the setpoint low limit on the lowest step of capacity, the micro will close the liquid line solenoid or EEV, after turning off hot gas, and pump the system down before turning off the last compressor in a system.

The leaving chilled liquid setpoint is programmable from 40°F to 70°F (4.4°C to 21.1°C) in water chilling mode and from 10°F to 70°F (-12.2°C to 21.1°C) in glycol chilling mode. In both modes, the cooling range can be from +/-1.5°F to +/-2.5°F (+/-.83°C to 1.39°C).leaving chilled liquid control

LEAVING CHILLED LIQUID CONTROL OVERRIDE TO REDUCE CYCLING

To avoid compressor cycling the micro will adjust the setpoint upward temporarily. The last run time of the system will be saved. If the last run time was greater than 5 minutes, no action is to be taken. If the last run time for the lead system was less than 5 minutes, the microprocessor will increase the setpoint high limit according to the chart in Fig. 14, with a maximum value allowed of 50°F. If adding the setpoint adjust value to the setpoint high limit causes the setpoint high limit to be greater than 50°F, the setpoint high limit will be set to 50°F, and the difference will be added to the setpoint low limit.

Once a system runs for greater than 5 minutes, the setpoint adjust will be set back to 0. This will occur while the system is still running.

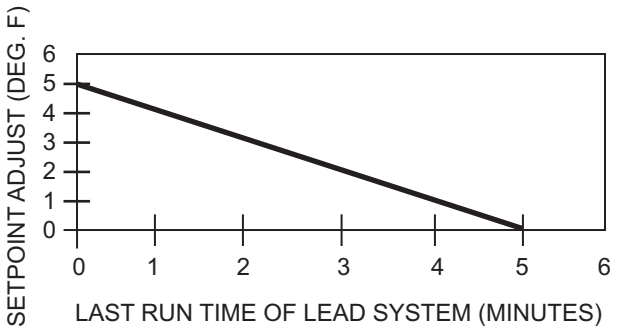


FIG. 14 – SETPOINT ADJUST

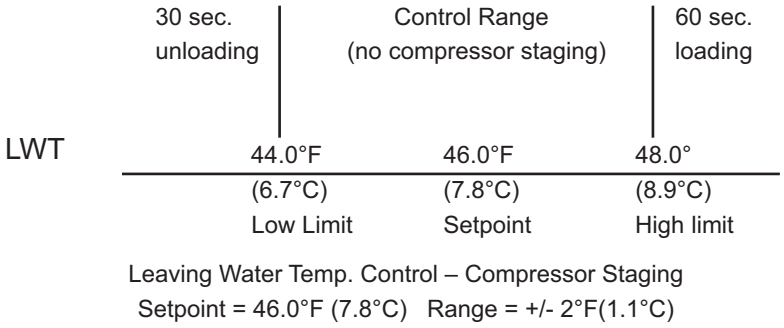


FIG. 13 – LEAVING WATER TEMPERATURE CONTROL EXAMPLE

LEAVING CHILLED LIQUID SYSTEM LEAD/LAG AND COMPRESSOR SEQUENCING

A Lead/Lag option may be selected to help equalize average run hours between systems with 2 refrigerant systems. This may be programmed under the OPTIONS key. Auto Lead/Lag allows automatic Lead/Lag of the two systems based on average run hours of the compressors in each system. Manual Lead/Lag selects specifically the sequence which the micro starts systems.

On a hot water start, once a system starts, it will turn on all compressors before the next system starts a compressor. The microprocessor will Lead/Lag compressors within each circuit to maximize individual compressor run time on individual compressors within a system.

Each compressor in a system will be assigned an arbitrary priority number 1, 2, or 1, 2, 3. The non-running compressor within a system with the lowest priority number will always be the next compressor to start. The running compressor with priority number 1 will always be the next to shut off. Whenever a compressor is shut off, the priority numbers of all compressors will be decreased by 1 with wrap-around. This control scheme assures the same compressor does not repeatedly cycle on and off.

Once the second system starts a compressor on a 2 system chillers, the micro will attempt to equally load each system as long as the system is not limiting or pumping down. Once this occurs, loading and unloading will alternate between systems, loading the lead system first or unloading the lag system first.

RETURN CHILLED LIQUID CONTROL

(Can be used on Dual System 4, 5 & 6 Comp Units Only)

Return chilled liquid control is based on staging the compressors to match the cooling load. The chiller will be fully loaded when the return water temperature is equal to the Cooling Setpoint plus the Range. The chiller will be totally unloaded (all compressors off) when the return water temperature is equal to the Cooling Setpoint *(See sample in Table 19)*. At return water temperatures between the Cooling Setpoint and Cooling Setpoint plus Range, compressor loading and unloading will be determined by the formulas in Table 20.

Return Chilled Liquid Control MUST only be used when constant chilled liquid flow is ensured.

The RANGE MUST always be programmed to equal the temperature drop across the evaporator when the chiller is "fully loaded". Otherwise, chilled liquid temperature will over or under shoot. Variable flow must never be used in return chilled liquid mode.

Normal loading will occur at intervals of 60 seconds according to the temperatures determined by the formulas. Unloading will occur at a rate of 30 seconds according to the temperatures determined in the formulas used to calculate the on and off points for each step of capacity.

The return chilled liquid setpoint is programmable from 40°F to 70°F (4.4°C to 21.1°C) in water chilling mode and from 10°F to 70°F (-12.2°C to 21.1°C) in glycol chilling mode. In both modes, the cooling range can be from 4°F to 20°F (2.2° to 11.1°C).

As an example of compressor staging *(refer to Table 19),* a chiller with six compressors using a Cooling Setpoint programmed for 45°F (7.20°C) and a Range Setpoint of 10°F (5.56°C). Using the formulas in Table 20, the control range will be split up into six (seven including hot gas) segments, with the Control Range determining the separation between segments. Note also that the Cooling Setpoint is the point at which all compressors are off, and Cooling Setpoint plus Range is the point all compressors are on. Specifically, if the return water temperature is 55°F (12.8°C), then all compressors will be on, providing full capacity. At nominal gpm, this would provide approximately 45°F (7.2°C) leaving water temperature out of the evaporator.

If the return water temperature drops to 53.4°F (11.9°C), one compressor would cycle off leaving five compressors running. The compressors would continue to cycle off approximately every 1.7°F (.94°C), with the exception of hot gas bypass. Notice that the hot gas bypass would cycle on when the return water temperature dropped to 46.25°F (7.9°C). At this point one compressor would be running with hot gas.

Should the return water temperature rise from this point to 46.7°F (8.2°C), the hot gas bypass would shut off, still leaving one compressor running. As the load increased, the compressors would stage on every 1.7°F (.94°C).

Also note that Table 20 not only provides the formulas for the loading (ON POINT) and unloading (OFF POINT) of the system, the "STEP" is also shown in the tables. The "STEP" is the increment in the sequence of the capacity control scheme that can be viewed under the OPER DATA key. R*efer to the section on the DISPLAY/PRINT keys for specific information on the OPER DATA key.*

RETURN CHILLLED LIQUID SYSTEM LEAD/LAG AND COMPRESSOR SEQUENCING

A lead/Lag option may be selected to help equalize average run hours between systems with 2 refrigerant systems. This may be programmed under the OPTIONS key. Auto Lead/Lag of the 2 systems based on average run hours of the compressors in each system. Manual Lead/Lag selects specifically the sequence which the micro starts the systems.

TABLE 19 – COMPRESSOR STAGING FOR RETURN WATER CONTROL

Compressor Staging for Return Water Control						
4 Compressor Cooling Setpoint = 45°F (7.2°C) Range = 10°F(5.6°C)						
# of Comp ON	**0**	*** 1+HG**	**1**	**2**	**3**	**4**
RWT	45°F (7.2°C)	46.25°F (7.9°C)	47.5°F (8.6°C)	50.0°F (10.0°C)	52.5°F (11.4°C)	55.0°F (12.8°C)

*Unloading only

TABLE 20 – RETURN CHILLED LIQUID CONTROL FOR 4 COMPRESSORS (6 STEPS)

*STEP	COMPRESSOR	COMPRESSOR ON POINT	COMPRESSOR OFF POINT
0	0	SETPOINT	SETPOINT
1	1 W/HGB	SP + CR/8 (Note 1)	SETPOINT
2	1 NO HGB	SP + CR/4	SP + CR/8
3	2	SP + 2*CR/4 (Note 2)	SP + CR/4
4	2	SP + 2*CR/4	SP + CR/4 (Note 3)
5	3	SP + 3*CR/4	SP + 2*CR/4
6	4	SP + CR	SP + 3*CR/4

Notes:

1. Step 1 is Hot Gas Bypass and is skipped when loading occurs. Hot Gas Bypass operation is inhibited during Pumpdown.
2. Step 3 is skipped when loading occurs.
3. Step 4 is skipped when unloading occurs.

* STEP can be viewed using the OPER DATA key and scrolling to COOLING DEMAND.

The micro will sequence compressors load and unload systems according to Table 21. The microprocessor will lead/lag compressors within each circuit to maximize individual compressor run time for the purpose of lubrication. It will also prevent the same compressor from starting 2 times in a row. The micro will not attempt to equalize run time on individual compressors within a system.

Each compressor in a system will be assigned an arbitrary number 1, or 2. The non-running compressor within a system with the lowest priority number will always be the next compressor to start. The running compressor with priority number 1 will always be the next compressor to shut off. Whenever a compressor is shut off, the priority numbers of all compressors in each system will be decreased by 1 with the wrap around. This control scheme assures the same compressor does not repeatedly cycle on and off.

ANTI-RECYCLE TIMER

The programmable anti-recycle timer assures that systems do not cycle. This timer is programmable under the PROGRAM key between 300 - 600 seconds. Whenever possible, to reduce cycling and motor heating, the anti-recycle timer should be adjusted to 600 seconds. The programmable anti-recycle timer starts the timer when the first compressor in a system starts. The timer begins to count down. If all of the compressors in a circuit cycle off, a compressor within the circuit will not be permitted to start until the anti-recycle timer has timed out. If the lead system has run for less than 5 minutes, 3 times in a row, the anti-recycle timer will be extended to 10 minutes.

ANTI-COINCIDENCE TIMER

Two timing controls are present in software to assure compressors within a circuit or between systems, do not start simultaneously. The anti-coincidence timer assures there is at least a one minute delay between system starts on 2-circuit systems. This timer is NOT programmable. The load timers further assure that there is a minimum time between compressor starts within a system.

EVAPORATOR PUMP CONTROL

The evaporator pump dry contacts (CTB2 – terminals 23 - 24) are energized when any of the following conditions are true:

1. Low Leaving Chilled Liquid Fault
2. Any compressor is running
3. Daily Schedule is not programmed OFF and Unit Switch is ON

The pump will not run if the micro panel has been powered up for less than 30 seconds or if the pump has run in the last 30 seconds to prevent pump motor overheating.

EVAPORATOR HEATER CONTROL

The evaporator heater is controlled by ambient air temperature. When the ambient temperature drops below 40°F (4.4°C) the heater is turned on. When the temperature rises above 45°F (7.2°C) the heater is turned off. An under voltage condition will keep the heater off until full voltage is restored to the system.

TABLE 21 – RETURN CHILLED LIQUID CONTROL FOR 4 COMPRESSORS (6 STEPS)

	LEAD SYSTEM				LAG SYSTEM		
Step	**COMP 1**	**COMP 2**	**-**		**COMP 1**	**COMP 2**	**-**
0	OFF	OFF	-		OFF	OFF	-
1	ON + HG	OFF	-	*See NOTE 1*	OFF	OFF	-
2	ON	OFF	-		OFF	OFF	-
3	ON	OFF	-	*See NOTE 2*	ON	OFF	-
4	ON	ON	-	*See NOTE 3*	OFF	OFF	-
5	ON	ON	-		ON	OFF	-
6	ON	ON	-		ON	ON	-

NOTES

1. Step is Hot Gas Bypass and is skipped when loading occurs. Hot Gas Bypass operation is inhibited during pumpdown. For Leaving Chilled Liquid Control the Hot Gas Bypass solenoid is energized only when the lead compressor is running and the LWT < SP, the Hot Gas Bypass solenoid is turned off when the LWT > SP + CR/2.

1. Step 1 is not used for loading or unloading.
2. Step 3 is skipped when loading occurs.
3. Step 4 is skipped when unloading occurs.

PUMPDOWN CONTROL

Each system has a pump-down feature upon shut-off. Manual pumpdown from the keypad is not possible. On a non-safety, non-unit switch shutdown, all compressors but one in the system will be shut off. The LLSV or EEV will also be turned off. The final compressor will be allowed to run until the suction pressure falls below the cutout, or for 180 seconds, whichever comes first.

The EEV pilot solenoid is also used as a low superheat safety device when the EEV is selected as the expansion valve type. While the system is running and not in a pumpdown mode, the EEV pilot solenoid will close if the suction superheat falls below 4°F. The EEV pilot solenoid will open again when the superheat rises above 7.0°F. This safety device is ignored for the first 30 seconds of system run time. If the EEV pilot solenoid is closed 10 times in 2 minutes on the safety device, the low superheat safety will be triggered.

CONDENSER FAN CONTROL (YCAL0041 – YCAL0071 CHILLERS)

Condenser fan operation must be programmed with the Options key under "Fan Control." Condenser fan control can be selected for Ambient Temp. and Discharge Pressure, or Discharge Pressure only.

The condenser fan control by "Ambient Temperature and Discharge Pressure" is a feature that is integral to the standard software control. If the optional discharge transducer is not installed, the condenser fans will operate based on outdoor ambient temperature only. *See Table 22.*

The condenser fan control by "Discharge Pressure" is a feature that can be selected if the discharge pressure transducer is installed and fan recycling is not a concern. Fan control by discharge pressure will work according to Table 23. The fan control on-pressure and fan differential off-pressure are programmable under the PROGRAM key.

A low ambient kit MUST be installed when "AMBIENT CONTROL LOW AMBIENT" is selected under the OPTIONS key.

Compressor damage could occur if programming does not match installed hardware.

STANDARD CONDENSER FAN CONTROL - YCAL0041 – YCAL0071

TABLE 22 – YCAL0041 – YCAL0071 CONDENSER FAN CONTROL USING OUTDOOR AMBIENT TEMPERATURE AND DISCHARGE PRESSURE (DISCHARGE PRESSURE CONTROLS WILL NOT FUNCTION AND FAN CONTROL WILL BE BASED ON AMBIENT TEMPERATURES ONLY, UNLESS THE OPTIONAL DISCHARGE PRESSURE TRANSDUCER IS INSTALLED).

FAN STAGE	ON	OFF	CONTACTOR		MICRO BOARD OUTPUT		FAN #	
			SYS 1	SYS 2	SYS 1	SYS 2	SYS 1	SYS 2
1	OAT > 25°F (-3.9°C) or DP> Fan Ctrl On Press	OAT < 20°F (6.7°C) and DP < Fan Ctrl On Press - (Diff. Press)	7M	10M	TB7-9	TB10-9	1	2
2	OAT > 65°F (18.3°C) or DP > Fan Ctrl On Press +40 PSIG (2.76 Bars)	OAT < 60°F (15.6°C) and DP < Fan Ctrl On Press - (Diff. Press + 40 PSIG (2.76 Bars))	7M & 8M	10M & 11M	TB7-9 & TB7-10	TB10-9 & TB10-10	1 & 3	2 & 4

TABLE 23 – YCAL0041 – YCAL0071 CONDENSER FAN CONTROL USING DISCHARGE PRESSURE ONLY

FAN STAGE	ON	OFF	CONTACTOR		MICRO BOARD OUTPUT TB-4		FAN #	
			SYS 1	SYS 2	SYS 1	SYS 2	SYS 1	SYS 2
1	DP > Fan Ctrl On Press	DP < Fan Ctrl On Press - (Diff. Press.)	7M	10M	TB7-9	TB10-9	3	4
2	DP > Fan Ctrl On Press + 40 PSIG (2.76 Bars)	DP < Fan Ctrl On Press - ((Diff. Press.) + 40 PSIG (2.76 Bars))	7M & 8M	10M & 11M	TB7-9 & TB7-10	TB10-9 & TB10-10	1 & 3	2 & 4

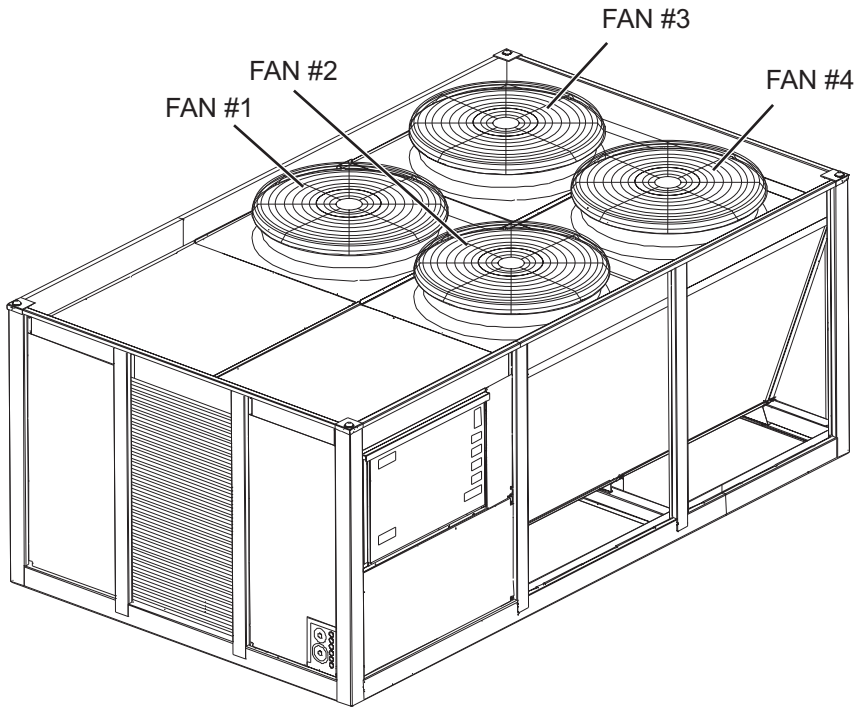


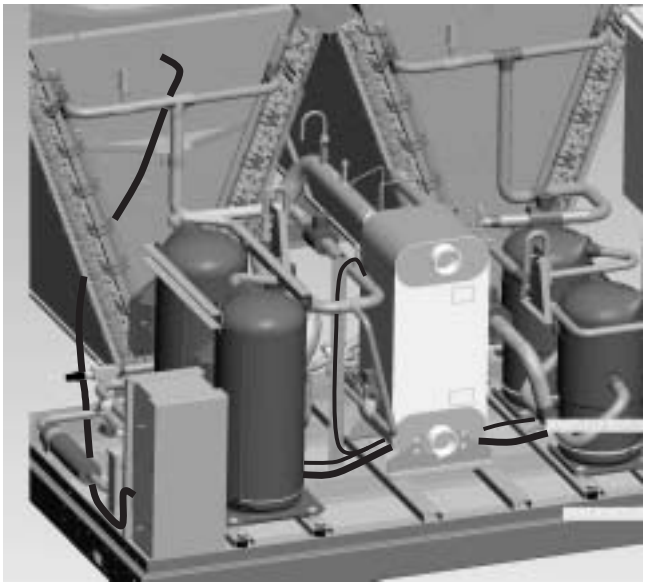
FIG. 15 – YCAL0041 – YCAL0071 FAN LOCATION (TYPICAL)

8

LOW AMBIENT FAN CONTROL OPTION

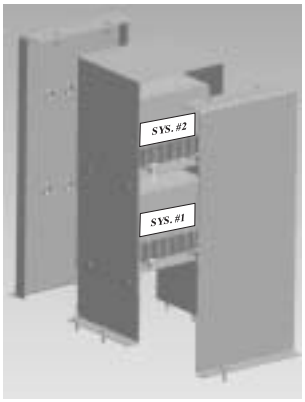
General

The low ambient option consists of a VFD (Variable Frequency Drive) for each system that controls the speed of the first fan (Fan 1, Sys #1 or Fan 2, Sys # 2) in the fan staging sequence. The VFD's are located in an enclosure in the compressor/piping/heat exchanger section on (2) compressor chillers. System # 1 VFD is located on the bottom and System # 2 is on the top. Single system chillers have the VFD installed on the top of chiller above the compressor section. Examples of the typical VFD location and enclosure mountings are shown in Figs. 13 and 14.



LD11298

FIG. 16 – TYPICAL INVERTER LOCATION



LD11299

FIG. 17 – INVERTER ENCLOSURE

The VFD will control fan speed when only a single fan is running on a system. As discharge pressure rises and falls, the fan speed will be increased from zero RPM to full speed. As discharge pressure continues to rise, the VFD will operate the fan at full speed and the second fan will be brought on in a system, if needed. Whenever the second fan is brought on, the inverter will already be running the first fan at full speed.

If discharge pressure falls, the chiller microprocessor will turn the second fan off by de-energizing the fan contactor. If pressure continues to fall, VFD speed will decrease in an effort to maintain discharge pressure. Speed may drop to the point where the VFD turns the fan completely off or virtually off with a continued drop in pressure.

The VFD control input signal is from the discharge pressure transducer in the respective system. The transducer signal feeds both the chiller microprocessor board input and the VFD.

The VFD will control the fan speed not only in low ambient conditions, but in all ambients based on discharge pressure. Speed control of the respective system will occur whenever high voltage power is applied to the VFD power inputs through the 7M (Sys 1) or 10M (Sys 2) contactors. The chiller microprocessor will energize the 7M and 10M contactors whenever the respective system liquid line solenoid is energized.

The VFD controls the speed of the fan based on a discharge pressure setpoint and a differential control range. When a compressor starts in a system, the inverter is activated through the 7M (Sys 1) or 10 M (Sys 2) contactor, which is controlled from the respective liquid line solenoid valve control signal. At discharge pressures below 160 PSIG, the VFD will turn the fan off or speed will be reduced to small movements in fan rotation.

The pressures indicated in this section describing the VFD control will vary from VFD to VFD. Expect tolerances for the entire pressure range of control to potentially shift -0 PSIG/+24 PSIG.

The VFD will ramp up the speed of the fan as pressure rises above the low end of the speed control range. Throughout the pressure control range, the VFD controls the speed of the fan based on discharge pressure in the range of approx 160-180 PSIG. At pressures above 180 PSIG, the VFD will run the system fan at full speed.

As pressure drops below 180 PSIG, the VFD will slow the speed of the fan to try to maintain discharge pressure within the control range. The VFD will try to maintain pressure in the range of 160-180 PSIG by raising and lowering the speed of the fan. If pressure drops below 160 PSIG, the VFD will virtually turn the system fan completely off. Some slight fan movement or very slow rotation may be noted, although the fan may appear to stop completely.

Configuration (Jumpers and Potentiometers)

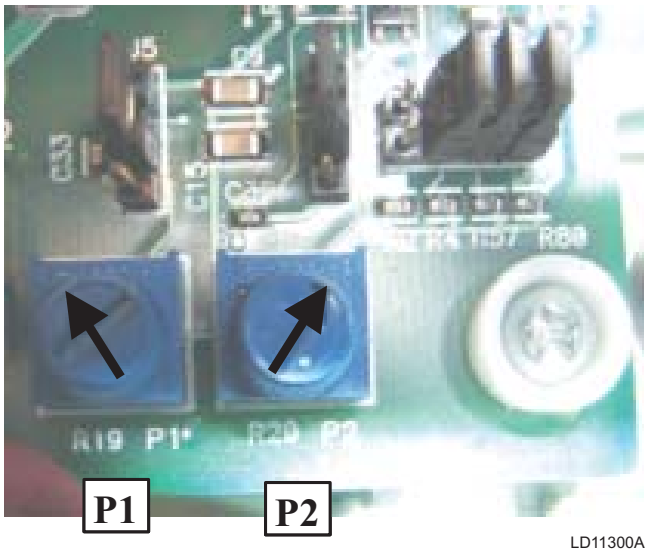
Each VFD is pre-configured at the factory prior to shipping and should be ready for operation when it arrives onsite. A quick check of the settings is recommended. The jumpers must be in the positions shown in the following Table.

NOTE

Chillers built in 2005 and early 2006 were configured with J4 IN. This jumper must be removed. Also be sure to check J2 and remove if necessary.

VFD JUMPERS		
J2	Remove	-
J3	IN	-
J4	Remove	-
J5	IN	-
J6	IN	-
J7	IN	-
J8	IN	-
J9	IN for 60Hz	Remove for 50Hz

POTENTIOMETER SETTINGS	
P1	P2
180 PSI	20 PSI



LD11300A

FIG. 18 – POTENTIOMETER SETTINGS

Potentiometer settings are also preset at the factory. The potentiometers should be in the positions shown in Fig.18. The pots do not have numerical settings and are set according to the arrow positions indicated. DO NOT change the potentiometer settings unless they do not match the positioning of the potentiometers shown in Fig. 18. P1 should be full CW (180 PSIG) and P2 should be full CCW (20 PSIG). Modifying these settings may cause damage to the chiller or control problems.

The P1 pot sets the setpoint which is the top end of the control range. This setting is the discharge pressure at which the fan will be operating at full speed. The P2 pot sets the range. This is the range of pressure where the VSD modulates the fan speed from 0 RPM to full speed. The range is subtracted from the setpoint to calculate the 0 RPM pressure.

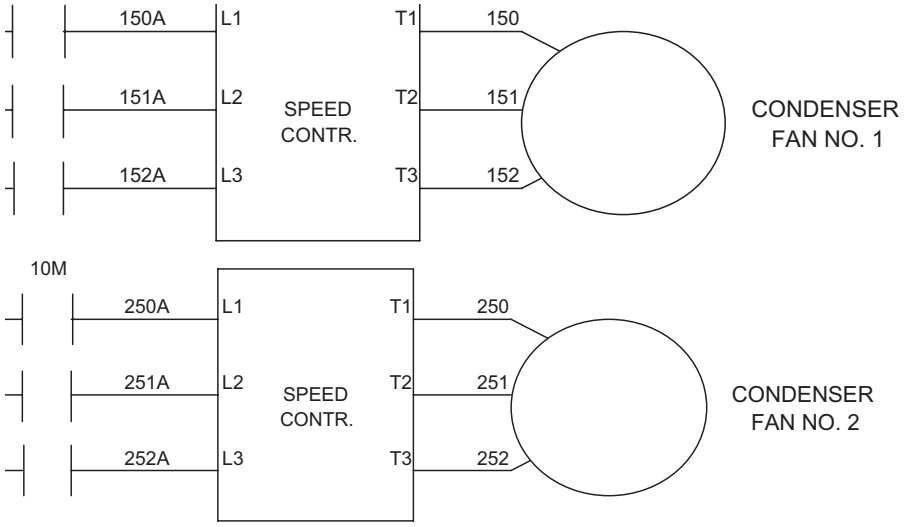
8

Wiring

VFD wiring is simple and requires only 3-phase power in, 3-phase power out, and a 2-wire signal from the transducer. No start, stop, or other alternate power requirements are needed to run the VFD. Fig's 19 and 20 show the power and control wiring schematically as well as the actual connections. The VFD controlled fan will operate whenever the liquid line solenoid on the respective system is energized.

NOTE

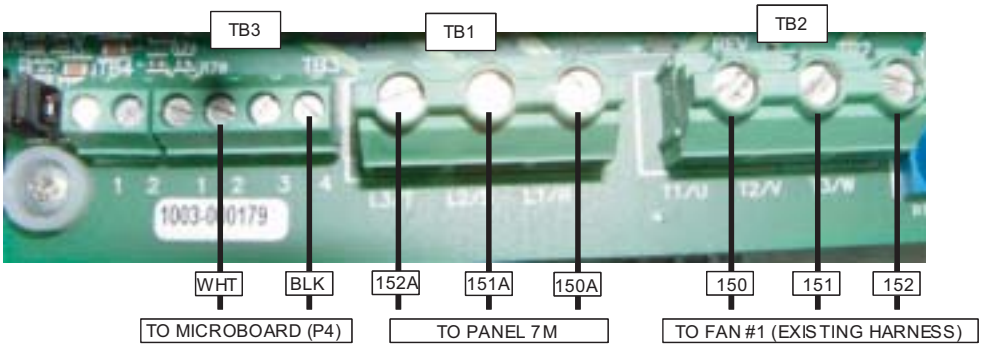
On chillers with the low ambient option, wire 127 is removed from TB7-3. Wire 227 is removed from TB10-9 and connected to TB10-3.



LD11301

FIG. 19 – INVERTER POWER WIRING SCHEMATIC

SYS 1



SYS 2

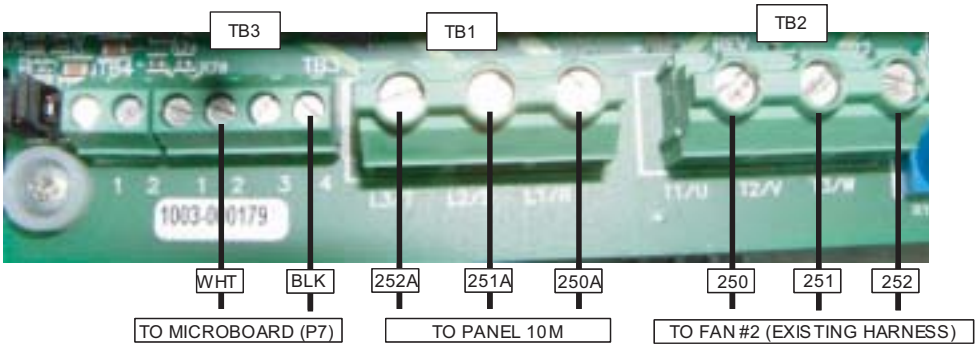


FIG. 20 – INVERTER WIRING

NOTE: Fans must run in the forward direction (AIR ↑)

LD11302

PROGRAMMING

Condenser fan control type must be programmed under both the OPTIONS and PROGRAM keys when a VFD is installed on the chiller. Under the OPTIONS key, FAN CONTROL must be programmed for DISCHARGE PRESSURE CONTROL only. This will assure the condenser fan control of the chiller is solely by discharge pressure, with no ambient control..

Under the PROGRAM key, the FAN CONTROL ON PRESSURE should be programmed for 240 PSIG and the FAN DIFFERENTIAL OFF PRESSURE must be programmed for 80 PSIG.

Programming as suggested assures the chiller control points for the second fan in the fan staging sequence and the inverter control points are matched for optimum control of the fans at reduced ambient temperatures. When the chiller and VFD fan control points are programmed properly, the fans will operate as outlined in Table 24.

LOAD LIMITING

Load Limiting is a feature that prevents the unit from loading beyond the desired value. 2 and 4 compressor units can be load limited to 50%. This would allow only 1 compressor per system to run. 3 and 6 compressor units can be load limited to 33% or 66%. The 66% limit would allow up to 2 compressors per system to run, and the 33% limit would allow only 1 compressor per system to run. Five-compressor units may be load limited to 40% (1 compressor per system runs) or 80% (up to 2 compressors per system) are permitted to run. No other values of limiting are available.

There are two ways to load limit the unit. The first is through remote communication via an ISN.

A second way to load limit the unit is through closing contacts connected to the Load Limit (CTB1 – Terminals 13 - 21) and PWM inputs (CTB1 – Terminals 13 - 20). Stage 1 of load limiting involves closing the Load Limit input. Stage 2 of load limiting involves closing both the Load Limit and PWM inputs. The first stage of limiting is either 80 %, 66% or 50%, depending on the number of compressors on the unit. The second stage of limiting is either 40% or 33% and is only available on 3, 5 & 6 compressor units. Table 25 shows the load limiting permitted for the various number of compressors.

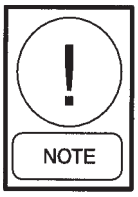
TABLE 24 – INVERTER OPTION CONDENSER FAN CONTROL OPERATION

FAN STAGE	ON	OFF	CONTACTOR		MICROBOARD		FAN #	
			SYS 1	SYS 2	SYS 1	SYS 2	SYS 1	SYS 2
1: INVERTER CONTROL (1 FAN VARIABLE SPEED)	DISCHARGE PRESSURE > 145 PSIG (FAN SPEED VARIED WITH PRESSURE CHANGE FROM 145-170 PSIG)	DISCHARGE PRESSURE < 145 PSIG	7M	10M	TB7-3	TB10-3	1	2
2: INVERTER CONTROL (1 FAN FULL SPEED UNDER INVERTER CONTROL AND 2ND FAN FULL SPEED UNDER CONTACTOR CONTROL)	DISCHARGE PRESSURE > PROGRAMMED FAN CONTROL ON PRESSURE	DISCHARGER PRESSURE < 170 PSIG (PRESSURE IS < FAN CONTROL ON PRESSURE MINUS FAN DIFFERENTIAL PRESSURE =170 PSIG)	7M & 8M	10M & 11M	TB7-3 & TB7-10	TB10-3 & TB10-10	1 & 3	2 & 4

8

TABLE 25 – COMPRESSOR OPERATION – LOAD LIMITING

COMPRESSORS IN UNIT	STAGE 1	STAGE 2
2	50%	-
3	66%	33%
4	50%	-
5	80%	40%
6	66%	33%



Simultaneous operation of Remote Load Limiting and EMS-PWM Temperature Reset (described on following pages) cannot occur.

COMPRESSOR RUN STATUS

Compressor run status is indicated by closure of contacts at CTB2 – terminals 25 to 26 for system 1 and CTB2 – terminals 27 to 28 for system 2.

ALARM STATUS

System or unit shutdown is indicated by normally-open alarm contacts opening whenever the unit shuts down on a unit fault, locks out on a system fault, or experiences a loss of power to the chiller electronics . System 1 alarm contacts are located at CTB2 – terminals 29 to 30. System 2 alarm contacts are located at CTB2 – terminals 31 to 32. The alarm contacts will close when conditions allow the unit to operate, or the fault is reset during a loss of power, the contacts will remain open until power is reapplied and no fault conditions exist.

EMS-PWM REMOTE TEMPERATURE RESET

EMS-PWM Remote Temperature Reset is a value that resets the Chilled Liquid Setpoint based on a PWM input (timed contact closure) to the microboard. This PWM input would typically be supplied by an Energy Management System.

A contact closure on the PWM Temp Reset input at CTB1 terminals 13 - 20, will reset the chilled liquid setpoint based on the length of time the contacts remain closed. The maximum temperature reset is achieved at a contact closure of 11 seconds. This is the longest contact closure time allowed. One second is the shortest time allowed and causes the Chilled Liquid Setpoint to revert back to the Local programmed value. The reset value is always added to the Chilled Liquid Setpoint, meaning that this function never lowers the Chilled Liquid Setpoint below the locally programmed value, it can only reset to a higher value. The microboard must be refreshed between 30 seconds and 30 minutes. Any contact closure occurring sooner than 30 seconds will be ignored. If more than 30 minutes elapse before the next contact closure, the setpoint will revert back to the locally programmed value. The new chilled liquid setpoint is calculated by the following equations:

Setpoint = Local Chilled Liquid Setpoint + °Reset

$$°\text{Reset} = (\text{Contact Closure} - 1) \times \left(\frac{*\text{Max. Reset Value}}{10}\right)$$

Example:
Local Chilled Liquid Setpoint = 45°F (7.22°C).
*Max Reset Value = 10°F (5.56°C)
Contact Closure Time = 6 Seconds.

(English)
(6 sec. - 1) (10°F/10) = 5°F Reset

The new chilled liquid setpoint = 45°F + 5°F= 50°F. This can be viewed by pressing the Cooling Setpoints key twice. The new value will be displayed as “REM SETP = 50.0°F.”

(Metric)
(6 sec - 1) * (5.56°C/10) = 2.78°C
Reset Cooling Setpoint = 7.22°C + 2.78°C = 10.0°C

The new Reset Cooling Setpoint = 7.22 °C + 2.78°C = 10°C. This can be viewed by pressing the Cooling Setpoints key twice. The new value will be displayed as “REM SETP = 10.0°C.”

* Max Reset Value is the “Max EMS-PWM Remote Temp. Reset” setpoint value described in the programming section under Cooling Setpoints. Programmable values are from 2°F to 40°F (1.11°C to 11.11°C).

BAS/EMS TEMPERATURE RESET OPTION

The Remote Reset Option allows the Control Center of the unit to reset the chilled liquid setpoint using a 0 - 10VDC input, a 4-20mA input, or a contact closure input. The Remote Reset circuit board converts the signals mentioned above into pulse width modulated (PWM) signals which the microprocessor can understand. Whenever a reset is called for, the change may be noted by pressing the Cooling Setpoints key twice. The new value will be displayed as "REM SETP = XXX°F."

The optional Remote Reset option would be used when reset of the chilled liquid setpoint is required and a PWM signal (timed contact closure) cannot be supplied by an Energy Management System. The Remote Temp. Reset Board will convert a voltage, current, or contact signal that is available from an EMS to a PWM signal, and every 80 seconds provide a PWM input to the microboard. Fig. 21 shows a diagram of the field and factory electrical connections.

If a **0 - 10VDC** signal is available, it is applied to terminals A+ and A-, and **jumpers are applied to JU4 and JU2** on the reset board. This DC signal is conditioned to a 1 - 11 second PWM output and supplied to the PWM input on the microboard at CTB1 terminals 13 - 20. To calculate the reset chilled liquid setpoint for values between 0VDC and 10VDC use the following formula:

Setpoint = Local Chilled Liquid Setpoint + °Reset

$$\text{°Reset} = \frac{(\text{DC voltage signal}) \times (\text{*Max Reset Value})}{10}$$

Example:
Local Chilled Liquid Setpoint = 45°F (7.22°C)
*Max Reset Value = 20°F (11.11°C)
Input Signal = 6VDC

(English)

$$\text{°Reset} = \frac{6\text{VDC} \times 20\text{°F}}{10} = 12\text{°F Reset}$$

New Setpoint = 45°F + 12°F = 57°F

(Metric)

$$\text{°Reset} = \frac{6\text{VDC} \times 11.11\text{°C}}{10} = 6.67\text{°C Reset}$$

New Setpoint = 7.22°C + 6.67°C = 13.89°C

* Max Reset Value is the "Max EMS-PWM Remote Temp. Reset" setpoint value described in the programming section under Cooling Setpoints. Programmable values are from 2°F to 40°F (1.11°C to 11.11°C).

If a **4-20mA signal is available,** it is applied to terminals A+ and A- and **jumpers are applied to JU5 and JU3** on the reset board. The mA signal is conditioned to a 1 - 11 second PWM output. The PWM output is then supplied to the PWM input on the microboard at CTB1 terminals 13 - 20. To calculate the chilled liquid setpoint for values between 4mA and 20 mA use the following formula:

Setpoint = Local Chilled Liquid Setpoint + °Reset

$$\text{°Reset} = \frac{(\text{mA signal} - 4) \times (\text{*Max Reset Value})}{16}$$

Example:
Local Chilled Liquid Setpoint = 45° (7.22°C)
*Max Reset Value = 10°F (5.56°C)
Input Signal = 12 mA

(English)

$$\text{°Reset} = \frac{8\text{mA} \times 10\text{°F}}{16} = 5\text{°F Reset}$$

Setpoint = 45°F + 5°F = 50°F

(Metric)

$$\text{°Reset} = \frac{8\text{mA} \times 5.56\text{°C}}{16} = 2.78\text{°C Reset}$$

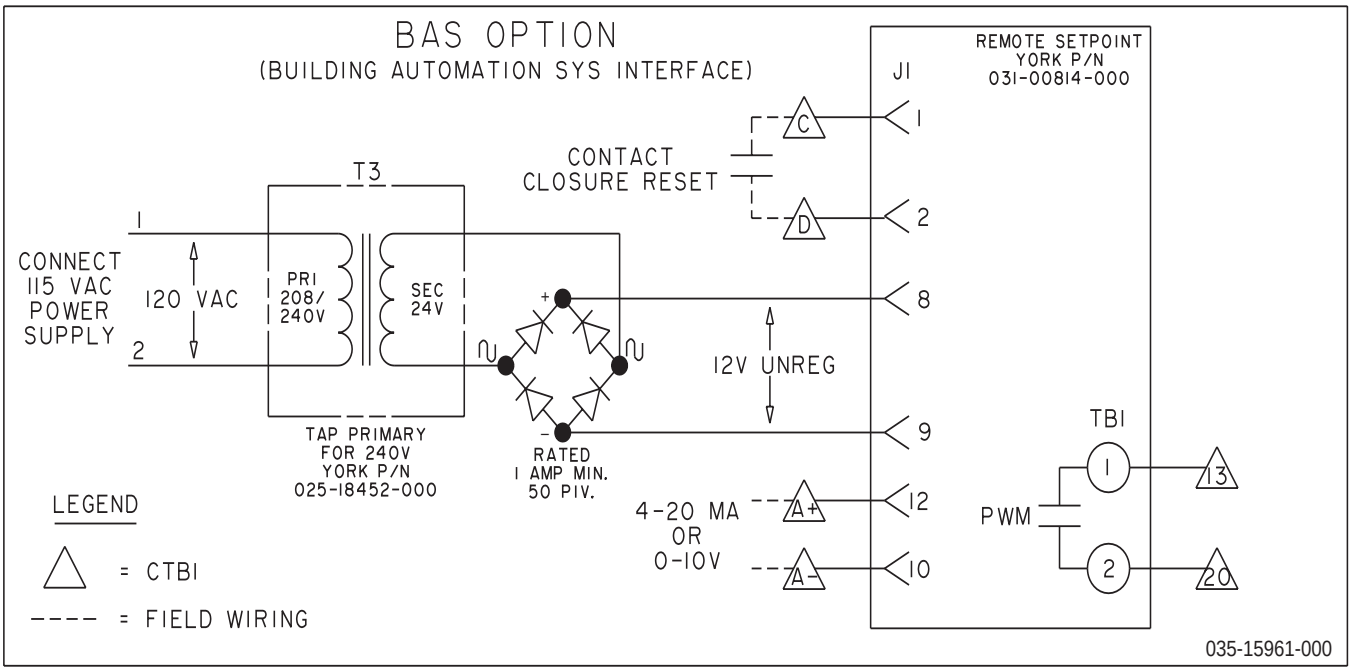
Setpoint = 7.22°C + 2.78°C = 10.0°C

A 240-24 Volt Ratio Transformer (T3) is used to derive nominal 12 volt output from the 120 volt supply.

If the **Contact Closure input** is used. The connections are made to terminals C and D and only **jumper JUI must be in place** on the reset board. This input is used when a *single* reset value is needed. When the contacts are closed, the remote temperature reset board will convert this contact closure to a PWM signal that is applied to CTB1 terminals 13 - 20.

To set the PWM output, the contacts must be closed on inputs C - D, and potentiometer R11 (located on the front edge of the PC board) is adjusted to 10VDC as measured at TP3 to terminal 10 on the circuit board. The reset value will be the "Max EMS-PWM Remote Temp. Reset" setpoint value programmed in the SETPOINTS section under the Cooling Setpoints key.

The coil of any added relay used for reset must be suppressed to prevent possible component damage. Use YORK PN 031-00808-000 suppressor.



LD03875A

FIG. 21 – FIELD AND FACTORY ELECTRICAL CONNECTIONS OPTIONAL REMOTE TEMPERATURE RESET BOARD

SECTION 9 - SERVICE AND TROUBLESHOOTING

CLEARING HISTORY BUFFERS

The history buffers may be cleared by pressing the HISTORY key and then repeatedly pressing the UP arrow key until you scroll past the last history buffer choice. The following message will be displayed:

```
INITIALIZE HISTORY
ENTER = YES
```

Pressing the ENTER/ADV key at this display will cause the history buffers to be cleared. Pressing any other key will cancel the operation.

DO NOT CLEAR BUFFERS. Important information may be lost. Contact factory service.

SERVICE MODE

Service Mode is a mode that allows the user to enable or disable all of the outputs (except compressors) on the unit, change chiller configuration setup parameters and view all the inputs to the microboard.

To enter Service Mode, turn the Unit Switch off and press the following keys in the sequence shown; PROGRAM, UP ARROW, UP ARROW, DOWN ARROW, DOWN ARROW, ENTER. Service Mode will time out after 30 minutes and return to normal control mode, if the panel is accidentally left in this mode. Otherwise, turning the unit switch on will take the panel out of Service Mode.

SERVICE MODE – OUTPUTS

After pressing the key sequence as described, the control will enter Service Mode permitting the *outputs (except compressors), operating hours, refrigerant type, expansion valve type, and start/hour counters* to be viewed/modified. The ENTER/ADV key is used to advance through the outputs. Using the ↑ and ↓ (UP/DOWN) arrow keys will turn the respective digital output on/off or modify the value.

Following is the order of outputs that will appear as the ENTER/ADV key is pressed:

SYS 1 COMP 1 STATUS TB7-2 IS:
SYS 1 LLSV STATUS TB7-3 IS:
SYS 1 COMP 2 STATUS TB7-4 IS:
SYS 1 COMP 3 STATUS TB7-5 IS:
SYS 1 HGBP STATUS TB7-7 IS:
SYS 2 COMP 1 STATUS TB10-2 IS:
SYS 2 LLSV STATUS TB10-3 IS:
SYS 2 COMP 2 STATUS TB10-4 IS:
SYS 2 COMP 3 STATUS TB10-5 IS:
SYS 1 FAN OUTPUT 1 TB7-8 IS:
SYS 1 FAN OUTPUT 2 TB7-9 IS:
SYS 1 FAN OUTPUT 3 TB7-10 IS:
SYS 2 FAN OUTPUT 1 TB10-8 IS:
SYS 2 FAN OUTPUT 2 TB10-9 IS:
SYS 2 FAN OUTPUT 3 TB10-10 IS:
EVAP HEATER STATUS TB8-2 IS:
SYS 1 ALARM STATUS TB8-3 IS:
SYS 2 ALARM STATUS TB9-2 IS:
EVAP PUMP STATUS TB8-6&7 IS:

Each display will also show the output connection on the microboard for the respective output status shown. For example:

```
SYS 1 LLSV STATUS
TB7-3 IS OFF
```

This display indicates that the system 1 liquid line solenoid valve is OFF, and the output connection from the microboard is coming from terminal block 3 - pin 2.

Pressing the ↑ (UP) arrow key will energize the liquid line solenoid valve and “OFF” will change to “ON” in the display as the LLSV is energized. Energizing and de-energizing outputs may be useful during troubleshooting.

SERVICE MODE – CHILLER CONFIGURATION

After the Outputs are displayed, the next group of displays relate to chiller configuration and start/hour counters. Data logging, soft start, refrigerant type, and expansion valve type all must be programmed to match actual chiller configuration.

Soft start, Refrigerant Type, and Expansion Valve Type MUST be properly programmed or damage to compressors and other system components may result.

Following is a list, in order of appearance:

DATA LOGGING MODE = : DO NOT MODIFY
DATA LOGGING TIMER = : DO NOT MODIFY
SOFT START
REFRIGERANT TYPE
EXPANSION VALVE TYPE
SYS 1 HOURS
SYS 2 HOURS
SYS 1 STARTS
SYS 2 STARTS

The last displays shown on the above list is for the accumulated run and start timers for each system. All values can also be changed using the ↑ (UP) and ↓ (Down) arrow keys, but under normal circumstances would not be advised. After the last start display, the micro will display the first programmable value under the PROGRAM key.

SERVICE MODE – INPUTS

After entering Service Mode (PROGRAM ↑↑ ↓↓), *all digital and analog inputs to the microboard can be viewed by pressing the OPER DATA key.* After pressing the OPER DATA key, the ↑ (UP) arrow and ↓ (DOWN) arrow keys are used to scroll through the analog and digital inputs.

Following is the order of analog and digital inputs that will appear when sequenced with the ↓ (Down) arrow key:

(analog inputs)
SYS 1 *SUCT PRESSURE
UNIT TYPE
SYS 1 **DISCH PRESSURE
SYS 1*** COOLER INLET REFRIG. TEMP.
SYS 2*** COOLER INLET REFRIG. TEMP.
SYS 1**** SUCTION TEMP.
SYS 2**** SUCTION TEMP.
AMBIENT AIR TEMP.
LEAVING LIQUID TEMP.
RETURN LIQUID TEMP.
SYS 2 *SUCTION PRESSURE
SYS 2 SPARE
SYS 2 **DISCH PRESSURE
SYS 1 MTR VOLTS
SYS 2 MTR VOLTS
(digital inputs)
PWM TEMP RESET INPUT
LOAD LIMIT INPUT
FLOW SW / REM START
SPARE
SINGLE SYSTEM SELECT
SYS 1 MP / HPCO INPUT
SYS 2 MP / HPCO INPUT

* The suction pressure transducer is optional on YCAL0014 - YCAL0060. A low pressure switch is standard on these models in place of the suction transducer.

** The discharge pressure transducer is optional on some models.

*** The cooler inlet refrigerant temp. sensor is on R-407c units only.

****The suction temp. sensor is on EEV units only.

The analog inputs will display the input connection, the temperature or pressure, and corresponding input voltage such as:

```
SYS 1 SUCT PR J7-10
2.1 VDC = 81 PSIG
```

This example indicates that the system 1 suction pressure input is connected to plug 4 - pin 10 (J7-10) on the microboard. It indicates that the voltage is 2.1 volts dc which corresponds to 81 PSIG (5.6 bars) suction pressure.

The digital inputs will display the input connection and ON/OFF status such as:

```
FLOW SW/REM START
J13-5 IS ON
```

This indicates that the flow switch/remote start input is connected to plug 9- pin 5 (J13-5) on the microboard, and is ON (ON = +30VDC unregulated input, OFF = 0VDC input on digital inputs).

CONTROL INPUTS/OUTPUTS

Tables 26 through 29 are a quick reference list providing the connection points and a description of the inputs and outputs respectively. All input and output connections pertain to the connections at the microboard.

TABLE 26 – MICROBOARD DIGITAL INPUTS

J13-2	Unit Switch
J13-3	Load Limit Stage 2 (3, 5 & 6 comp units)
J13-4	Load Limit Stage 1
J13-5	Flow Switch and Remote Start / Stop (Sys 1 Zone Thermostat)
J13-6	Spare (Sys 2 Zone Thermostat - SP Control Only)
J13-7	Single System Select (Jumper = Single Sys, No Jumper = Two Sys)
J13-8	CR1 (Sys 1 MP/HPCO)
J13-10	CR2 (Sys 2 MP/HPCO)
J13-9	Spare
J13-11	Spare

TABLE 27 – MICROBOARD DIGITAL OUTPUTS

TB7-2	Sys 1 Compressor 1
TB7-3	Sys 1 Liquid Line Solenoid Valve Sys 1 Mode Solenoid Valve (HP only)
TB7-4	Sys 1 Compressor 2
TB7-5	Sys 1 Compressor 3
TB7-7	Sys 1 Hot Gas Bypass Valve
TB10-2	Sys 2 Compressor 1
TB10-3	Sys 2 Liquid Line Solenoid Valve Sys 2 Mode Solenoid Valve (HP Only)
TB10-4	Sys 2 Compressor 2
TB10-5	Sys 2 Compressor 3
TB7-8	Sys 1 Condenser Fan Output 1
TB7-9	Sys 1 Condenser Fan Output 2
TB7-10	Sys 1 Condenser Fan Output 3
TB10-8	Sys 2 Condenser Fan Output 1
TB10-9	Sys 2 Condenser Fan Output 2
TB10-10	Sys 2 Condenser Fan Output 3
TB8-2	Evaporator Heater
TB8-3	Sys 1 Alarm
TB9-2	Sys 2 Alarm
TB8-6 & 7	Evaporator Pump Starter
TB10-7	Sys 2 Hot Gas Bypass Valve
TB8-4	Evaporator Pump Starter 2
TB8-5	Spare
TB8-9	Spare
TB9-4	Bivalent Heat Step (HP only)

TABLE 28 – MICROBOARD ANALOG INPUTS

J7-10	Sys 1 Suction Pressure Transducer or Sys 1 Low Pressure Switch
J11-12	Unit Type Select: Chiller, Cond Unit, Heatpump
J7-11	Sys 1 Discharge Pressure Transducer (Optional)
J11-11	Remote Temperature Reset
J8-7	Sys 1 Suction Temp Sensor (Non-MMHP Cond Unit - Optional) Sys 1 Discharge Temp Sensor (R22 - Optional)
J10-7	Sys 2 Suction Temp Sensor (Non-MMHP Cond Unit - Optional) Sys 2 Discharge Temp Sensor (R22 - Optional)
J8-8	Sys 1 Suction Temp Sensor (EEV Option & MMHP Cond Unit)
J10-8	Sys 2 Suction Temp Sensor (EEV Option & MMHP Cond Unit)
J6-9	Ambient Air Temp Sensor
J6-7	Leaving Chilled Liquid Temp Sensor
J6-8	Return Chilled Liquid Temp Sensor / Discharge Air Temp Sensor
J9-10	Sys 2 Suction Pressure Transducer or Sys 2 Low Pressure Switch
J11-13	
J9-11	Sys 2 Discharge Pressure Transducer (Optional)
J7-12	Unit/Sys 1 Voltage
J9-12	Sys 2 Voltage
J11-14	Evap Pump 1 Trip Input
J11-15	Evap Pump 2 Trip Input
J8-9	Spare
J10-9	Spare
J12-9	Spare
J12-10	Spare
J12-11	Spare
J12-12	Spare

TABLE 29 – MICROBOARD ANALOG OUTPUTS

TB5-1 & 2	Sys 1 EEV Output
TB6-1 & 2	Sys 2 EEV Output
J15-3, 7	Spare
J15-4 ,8	Spare
J15-1&5	Sys 1 Condenser Fan Speed
J15-2&6	Sys 2 Condenser Fan Speed

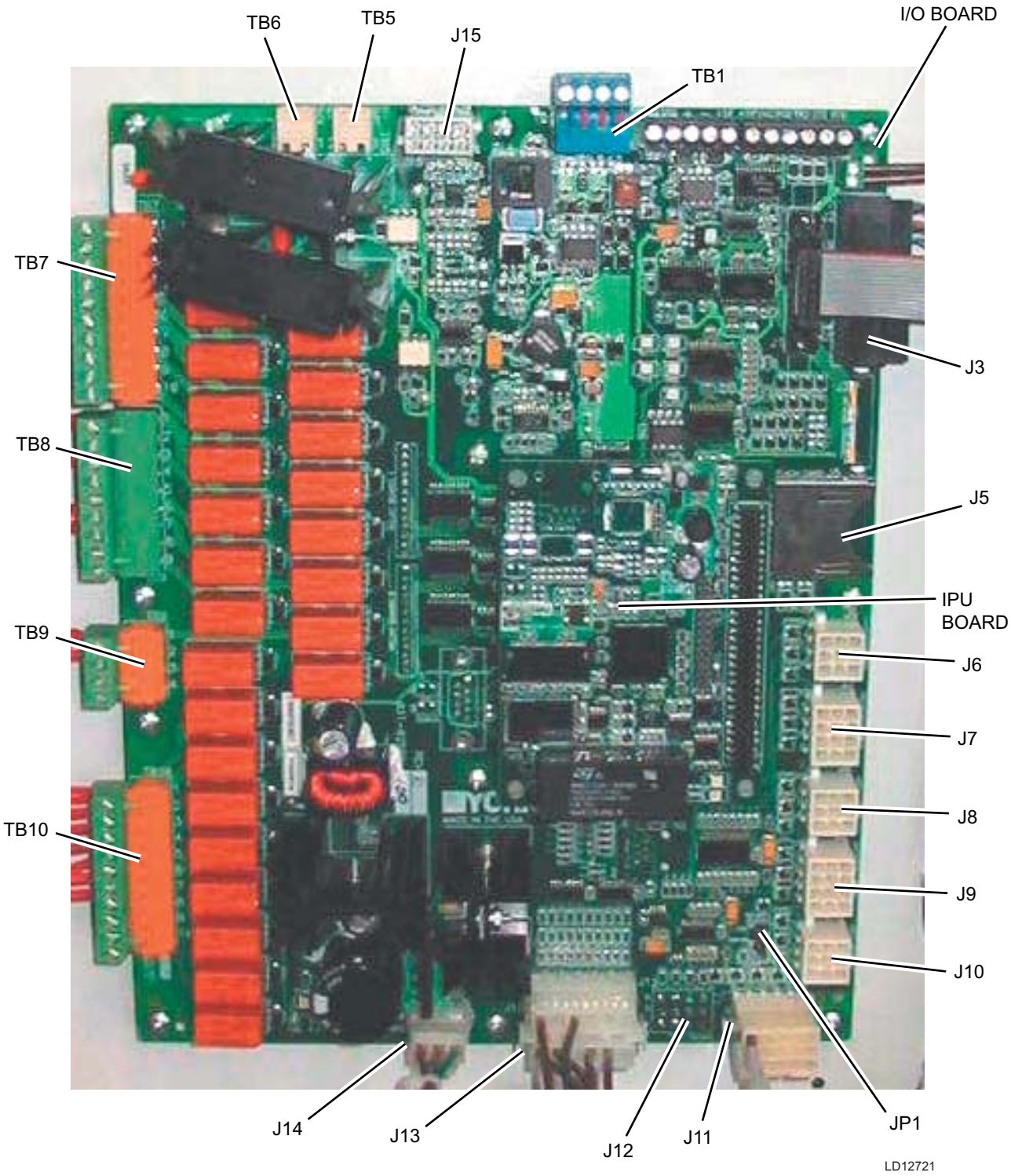


FIG. 22 – IPU II & I/O LAYOUT

CHECKING INPUTS AND OUTPUTS

Digital Inputs

Refer to the unit wiring diagram. All digital inputs are connected to J9 of the microboard. The term "digital" refers to two states – either on or off. As an example, when the flow switch is closed, 30 volts ***DC*** will be applied to J13, pin 5 (J13-5) of the microboard. If the flow switch is open, 0 volts DC will then be present at J13-5.

Pin 1 of J13 is an ***unregulated*** 30VDC ***source*** used to supply the DC voltage to the various user contacts, unit switch, flow switch, etc. This DC source is factory wired to CTB1, terminal 13. Any switch or contact used as a digital input would be connected to this terminal, with the other end connecting to its respective digital input on the microboard. Any time a switch or contact is closed, 30VDC would be applied to that particular digital input. Any time a switch or contact is open, 0VDC would be applied to that particular digital input.

Typically, voltages as high as 34VDC could be measured for the DC voltage on the digital inputs. This voltage is in reference to ground. The unit case should be sufficient as a reference point when measuring digital input voltages.

Analog Inputs – Temperature

Refer to the unit wiring diagram. Temperature inputs are connected to the microboard on plug J6. These ***analog*** inputs represent varying DC signals corresponding to varying temperatures. All voltages are in reference to the unit case (ground). Following are the connections for the temperature sensing inputs:

Outside Air Sensor

J6-6 = +5VDC regulated supply to sensor.
J6-9 = VDC input signal to the microboard.
See Table 30 for voltage readings that correspond to specific outdoor temperatures.
J6-3 = drain (shield connection = 0VDC) Return

TABLE 30 – OUTDOOR AIR SENSOR TEMPERATURE/VOLTAGE/ RESISTANCE CORRELATION

TEMP°F	VOLTAGE (Signal Input to Return)	TEMP°C
0	0.7	-18
5	0.8	-15
10	0.9	-12
15	1.0	-9
20	1.1	-7
25	1.2	-4
30	1.4	-1
35	1.5	2
40	1.7	4
45	1.8	7
50	2.0	10
55	2.2	13
60	2.3	16
65	2.5	18
70	2.6	21
75	2.8	24
80	2.9	27
85	3.1	29
90	3.2	32
95	3.4	35
100	3.5	38
105	3.6	41
110	3.7	43
115	3.8	46
120	3.9	49
125	4.0	52
130	4.1	54

TABLE 31 – ENTERING/LEAVING CHILLED LIQUID TEMP. SENSOR, COOLER INLET TEMPERATURE SENSOR, AND SUCTION TEMPERATURE SENSOR: TEMPERATURE/ VOLTAGE CORRELATION

TEMP°F	VOLTAGE (Signal Input to Return)	TEMP°C
10	1.33	-12
12	1.39	-11
14	1.46	-10
16	1.51	-9
18	1.58	-8
20	1.65	-7
22	1.71	-6
24	1.78	-4
26	1.85	-3
28	1.91	-2
30	1.98	-1
32	2.05	0
34	2.12	1
36	2.19	2
38	2.26	3
40	2.33	4
42	2.40	6
44	2.47	7
46	2.53	8
48	2.60	9
50	2.65	10
52	2.73	11
54	2.80	12
56	2.86	13
58	2.92	14
60	2.98	16
62	3.05	17
64	3.11	18
66	3.17	19
68	3.23	20
70	3.29	21
72	3.34	22
74	3.39	23
76	3.45	24
78	3.5	26
80	3.54	27

Liquid & Refrigerant Sensor Test Points

(TABLE 31)

Entering Chilled Liquid Sensor

J6-5 = +5VDC regulated supply to sensor.
J6-8 = VDC input signal to the microboard. *See Table 31 for voltage readings that correspond to specific liquid temperatures.*
J6-2 = drain (shield connection = 0VDC) Return

Leaving Chilled Liquid Temperature Sensor

J6-4 = +5VDC regulated supply to sensor.
J6-7 = VDC input signal to the microboard. *See Table 31 for voltage readings that correspond to specific liquid temperatures.*
J6-1 = drain (shield connection = 0VDC) Return

Analog Inputs – Pressure

Refer to the unit wiring diagram. Pressure inputs are connected to the microboard on plugs J7 and J9. These ***analog*** inputs represent varying dc signals corresponding to varying pressures. All voltages are in reference to the unit case (ground).

System 1 discharge and suction pressures will be connected to J7 of the microboard. System 2 discharge and suction pressure transducers will be connected to J9 of the microboard.

The discharge transducers are optional on all units. If the discharge transducers are not installed, no connections are made to the microboard and the discharge pressure readout on the display would be zero.

The suction pressure transducers are standard on all YCAL's. The suction pressure transducers have a range of 0 to 200 PSIG. The output will be linear from 0.5VDC to 4.0VDC over the 200 PSIG (13.79 BARG) range.

The discharge transducers have a range from 0 to 400 PSIG. The output will be linear from 0.5VDC to 4.5VDC over the 400 PSIG (27.5 BARG) range. Following is the formula that can be used to verify the voltage output of the transducer. All voltage reading are in reference to ground (unit case).

V = (Pressure in PSIG x .01) + .5
or
V = (Pressure in BARG x .145) + .5

where V = dc voltage output
Pressure = pressure sensed by transducer

The microboard connections for the Discharge Transducers:

System 1 Discharge Transducer

J7-6 = +5VDC regulated supply to transducer.
J7-11 =VDC input signal to the microboard. *See the formula above for voltage readings that correspond to specific discharge pressures.*
J7-7 = +5VDC return
J7-2 = drain (shield connection = 0VDC)

System 2 Discharge Transducer

J9-6 = +5VDC regulated supply to transducer.
J9-11 =VDC input signal to the microboard. *See the formula above for voltage readings that correspond to specific discharge pressures.*
J9-7 = +5VDC return
J9-2 = drain (shield connection = 0VDC)

The suction transducers have a range from 0 to 200 PSIG (13.79 BARG). The output will be linear from .5VDC to 4.5VDC over the 200 PSIG (13.79 BARG) range. Following is a formula that can be used to verify the voltage output of the transducer. All voltage reading are in reference to ground (unit case).

V = (Pressure in PSIG x .02) + .5
or
V = (Pressure in BARG x .29) + .5

where V = dc voltage input to micro
Pressure = pressure sensed by transducer

Following are the microboard connections for the Suction Transducer:

System 1 Suction Transducer

J7-5 = +5VDC regulated supply to transducer.
J7-10 = VDC input signal to the microboard. *See the formula above for voltage readings that correspond to specific suction pressures.*
J7-9 = +5VDC return
J7-1 = drain (shield connection = 0VDC)

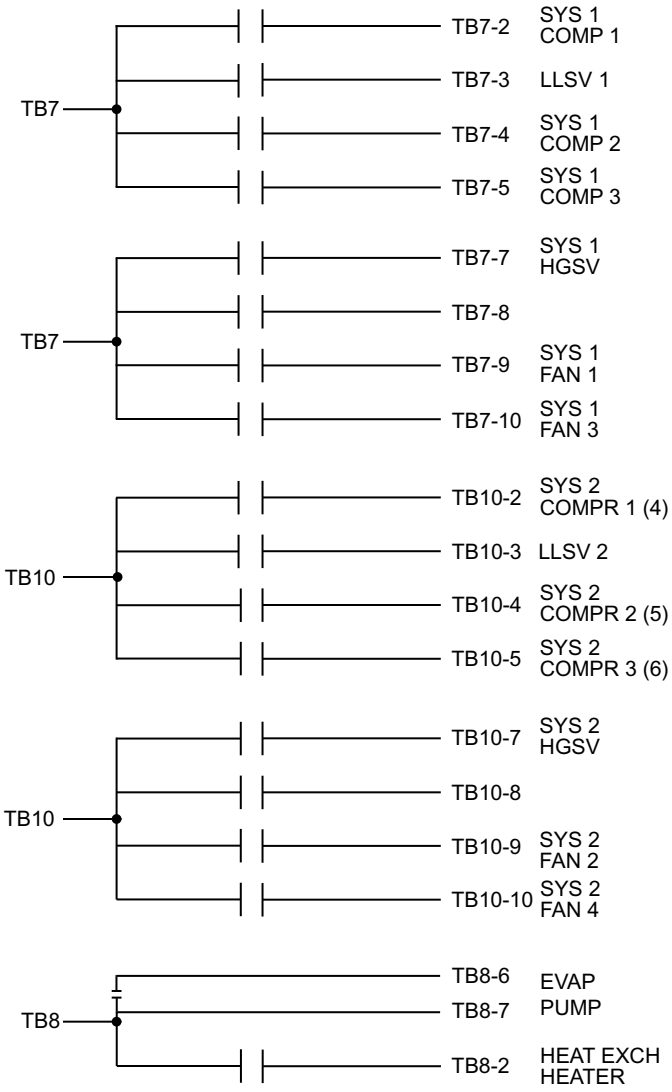
System 2 Suction Transducer

J9-5 = +5VDC regulated supply to transducer.
J9-10 = VDC input signal to the microboard. *See the formula above for voltage readings that correspond to specific suction pressures.*
J9-9 = +5VDC return
J9-1 = drain (shield connection = 0VDC)

Digital Outputs

Refer to the unit wiring diagram and Fig. 23. The digital outputs are located on TB3, TB4, and TB5 of the microboard. **ALL OUTPUTS ARE 120VAC** with the exception of TB5-3 to TB5-4. TB5-3 to TB5-4 are the contacts that can be used for an evaporator pump start signal. The voltage applied to either of these terminals would be determined by field wiring.

Each output is controlled by the microprocessor by switching 120VAC to the respective output connection energizing contactors, evaporator heater, and solenoids according to the operating sequence.



LD12722A

FIG. 23 – MICROBOARD RELAY CONTACT ARCHITECTURE

OPTIONAL PRINTER INSTALLATION

The micro panel is capable of supplying a printout of chiller conditions or fault shutdown information at any given time. This allows operator and service personnel to obtain data and system status with the touch of the keypad. In addition to manual print selection, the micro panel will provide an automatic printout whenever a fault occurs. Detailed explanation of the print function is given under "Print Key" located in the Keypad and Display section.

YORK recommends the field tested WEIGH-TRONIX model 1220 printer (or former IMP 24). This is a compact low cost printer that is ideal for service work and data logging.

The WEIGH-TRONIX printer can be obtained by contacting WEIGH-TRONIX for purchase information at:

WEIGH-TRONIX
2320 Airport Blvd.
Santa Rosa, CA 95402
Phone: 1-800-982-6622 or 1-707-527-5555
(International Orders Only)

The part number for the printer that is packaged specifically for YORK is P/N 950915576. The cable to connect the printer can either be locally assembled from the parts listed, or ordered directly from WEIGH-TRONIX under part number 287-040018.

Parts

The following parts are required:

1. WEIGH-TRONIX model 1220 printer.
2. 2.25" (5.7cm) wide desk top calculator paper.
3. 25 ft. (7.62m) maximum length of Twisted Pair Shielded Cable (minimum 3 conductor), #18 AWG stranded, 300V minimum insulation.
4. One 25 pin Cannon connector and shell.
   Connector: Cannon P/N DB-25P or equivalent.
   Shell: Cannon P/N DB-C2-J9.

Assembly and Wiring

All components should be assembled and wired as shown in Fig. 24. Strip the outside insulation back several inches and individual wires about 3/8" (9.5 mm) to connect the cable at the Microboard. Do not connect the shield at the printer-end of the cable.

Obtaining a Printout

A printout is obtained by pressing the "PRINT" key on the keypad and then pressing either the "OPER DATA" key or "HISTORY" key.

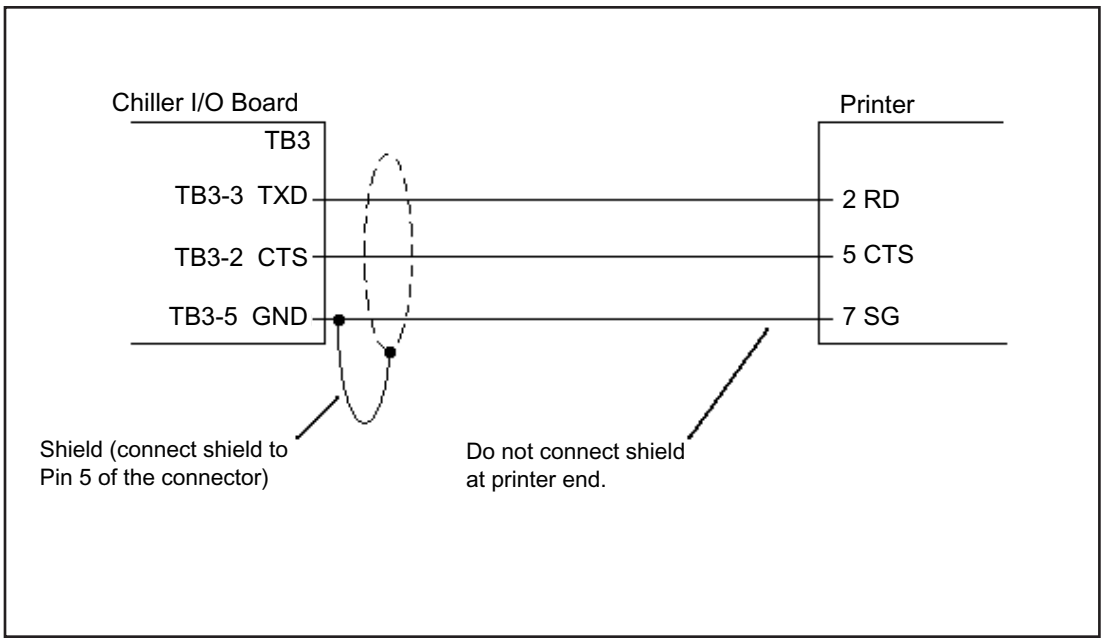


FIG. 24 – PRINTER TO MICROBOARD ELECTRICAL CONNECTIONS

9

TROUBLESHOOTING

TABLE 32 – TROUBLESHOOTING

PROBLEM	CAUSE	SOLUTION
NO DISPLAY ON PANEL. UNIT WILL NOT OPERATE.	1. No 115VAC to 24 VAC Transformer IT	1a. Check wiring and fuse 1FU b. Check wiring emergency stop contacts 5 to L of TB1 Terminal Block. c. Replace 1T
	2. No 24VAC to Microboard	2. Check wiring 1T to Microboard.
	3. Control Transformer IT defective, no 24VAC output.	3. Replace 1T
	4. Short in wire to temp. sensors or pressure transducers.	4. Unplug connections at Microboard to isolate.
	5. Defective IPU & I/O board or Display board.	5. Replace Microboard. ! NOTE ***Contact YORK Service before Replacing circuit Boards!***
"FLOW SWITCH/REM STOP NO RUN PERMISSIVE"	1. No chilled liquid flow.	1. Check chilled liquid flow.
	2. Flow switch improperly installed.	2. Check that the flow switch is installed according to manufacturer's instructions.
	3. Defective flow switch.	3. Replace flow switch.
	4. Remote cycling device open.	4. Check cycling devices connected to terminals 13 and 14 of the CTB1 Terminal Block.
"LOW SUCTION PRESSURE" FAULT	1. Improper suction pressure cutouts adjustments.	1. Adjust per recommended settings.
	2. Low refrigerant charge.	2. Repair leak if necessary and add refrigerant.
	3. Fouled filter dryer.	3. Change dryer/core.

CONT'D

TROUBLESHOOTING (CONT'D)

PROBLEM	CAUSE	SOLUTION
"LOW SUCTION PRESSURE" FAULT (CONT'D)	4. TXV defective.	4. Replace TXV.
	5. Reduced flow of chilled	5. Check GPM *(See "Limita tions" liquid through the cooler in Installation section).* Check operation of pump, clean pump strainer, purge chilled liquid system of air.
	6. Defective suction pressure transducer/low pressure switch or wiring.	6. Replace transducer/low pressure switch or faulty wiring. *Refer to "Service" section for pressure/voltage formula.*
	7. LLSV defective	7. Replace LLSV
"HIGH DISCHARGE PRESSURE" FAULT	1. Condenser fans not operating or operating backwards.	1. Check fan motor, fuses, and contactors. Assure fan blows air upward.
	2. Too much refrigerant.	2. Remove refrigerant.
	3. Air in refrigerant system.	3. Evacuate and recharge system.
	4. Defective discharge pressure transducer.	4. Replace discharge pressure transducer. *Refer to Service section for pressure/voltage formula.*
"LOW LIQUID TEMP" FAULT	1. Improperly adjusted leaving chilled liquid temp. cutout (glycol only).	1. Re-program the leaving chilled liquid temp. cutout.
	2. Micro panel setpoint/range values improperly programmed.	2. Re-adjust setpoint/range.
	3. Chilled liquid flow too low.	3. Increase chilled liquid flow - *refer to Limitations in Instal- lation section.*
	4. Defective LWT or RWT sensor (assure the sensor is properly installed in the bottom of the well with a generous amount of heat) conductive compound).	4. Compare sensor against a known good temperature sensing device. *Refer to Service section for temp./ voltage table.*

CONT'D

TROUBLESHOOTING (CONT'D)

PROBLEM	CAUSE	SOLUTION
"MP / HPCO" FAULT	1. Compressor internal motor protector (MP) open.	1. Verify refrigerant charge is not low. Verify superheat setting of °10 - 15°F (5.6° - 8.3°C). Verify correct compressor rotation. Verify compressor is not over loaded.
	2. External overload tripped.	2. Determine cause and reset.
	3. HPCO switch open.	3. *See "High Press. Disch." Fault.*
	4. Defective HPCO switch.	4. Replace HPCO switch.
	5. Defective CR relay.	5. Replace relay.
COMPRESSOR(S) WON'T START	1. Demand not great enough.	1. No problem. Consult "Installation" Manual to aid in understanding compressor operation and capacity control.
	2. Defective water temperature sensor.	2. Compare the display with a thermometer. Should be within +/- 2 degrees. *Refer to Service section for RWT/ LWT temp./voltage table.*
	3. Contactor/Overload failure.	3. Replace defective part.
	4. Compressor failure.	4. Diagnose cause of failure and replace.
LACK OF COOLING EFFECT	1. Fouled evaporator surface. Low suction pressure will be observed.	1. Contact the local YORK service representative.
	2. Improper flow through the evaporator.	2. Reduce flow to within chiller design specs. *See Limitations in Installation section.*
	3. Low refrigerant charge. Low suction pressure will be observed.	3. Check subcooling and add charge as needed.

SECTION 10 - MAINTENANCE

It is the responsibility of the equipment owner to provide maintenance on the system.

IMPORTANT

If system failure occurs due to improper maintenance during the warranty period, YORK will not be liable for costs incurred to return the system to satisfactory operation. The following is intended only as a guide and covers only the chiller unit components. It does not cover other related system components which may or may not be furnished by YORK. System components should be maintained according to the individual manufacture's recommendations as their operation will affect the operation of the chiller.

COMPRESSORS

Oil Level check

The oil level can only be tested when the compressor is running in stabilized conditions, to ensure that there is no liquid refrigerant in the lower shell of the compressor. When the compressor is running at stabilized conditions, the oil level must be between 1/4 and 3/4 in the oil sight glass. Note: at shutdown, the oil level can fall to the bottom limit of the oil sight glass. Use YORK "F" oil when adding oil.

Oil Analysis

The oil used in these compressors is pale yellow in color (mineral oil). If the oil color darkens or exhibits a change in color, this may be an indication of contaminants in the refrigerant system. If this occurs, an oil sample should be taken and analyzed. If contaminants are present, the system must be cleaned to prevent compressor failure.

Never use the scroll compressor to pump the refrigerant system down into a vacuum. Doing so will cause internal arcing of the compressor motor which will result in failure of compressor.

CONDENSER FAN MOTORS

Condenser fan motors are permanently lubricated and require no maintenance.

CONDENSER COILS

Dirt should not be allowed to accumulate on the condenser coil surfaces. Cleaning should be as often as necessary to keep coils clean.

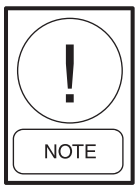
Exercise care when cleaning the coil so that the coil fins are not damaged.

OPERATING PARAMETERS

Regular checks of the system should be preformed to ensure that operating temperatures and pressures are within limitations, and that the operating controls are set within proper limits. *Refer to the Operation, Start-Up, and Installation sections of this manual.*

ON-BOARD BATTERY BACK-UP

U5 is the Real Time Clock chip located on the 031-02630 IPU II board that maintains the date/time and stores customer programmed setpoints. The Real Time Clock is a 128K bram, P/N 031-02565-000. The IPU II board must have JP1 removed when the 128K bram is installed.



Do not confuse JP1 on the IPU II (031-02630) board with JP1 on the I/O (031-02550) board.

PLATE AND FRAME HEAT EXCHANGER (EVAPORATOR) HEATER

The Plate and Frame Heat Exchanger (evaporator) heater is 120VAC. Disconnecting 120VAC power from the unit, at or below freezing temperatures, can result in damage to the evaporator and unit as a result of the chilled liquid freezing.

OVERALL UNIT INSPECTION

In addition to the checks listed on this page, periodic overall inspections of the unit should be accomplished to ensure proper equipment operation. Items such as loose hardware, component operation, refrigerant leaks, unusual noises, etc. should be investigated and corrected immediately.

ISN CONTROL

RECEIVED DATA (CONTROL DATA)

The Middle Market receives 8 data values from the ISN. The first 4 are analog values and the last 4 are digital values. These 8 data values are used as control parameters when in REMOTE mode. When the unit is in LOCAL mode, these 8 values are ignored. If the unit receives no valid ISN transmission for 5 minutes it will revert back to all local control values. Table 33 lists the 4 control parameters. These values are found under feature 54 on the ISN.

TABLE 33 – ISN RECEIVED DATA

ISN PAGE	CONTROL DATA
P03	SETPOINT 99 = AUTO
P04	LOAD LIMIT STAGE (0,1, 2)
P05	–
P06	–
P07	START/STOP COMMAND (0 = STOP, 1 = RUN)
P08	—
P09	—
P10	HISTORY BUFFER REQUEST (0 = CURRENT DATA, 1 = LAST HISTORY DATA)

TRANSMITTED DATA

After receiving a valid transmission from the ISN, the unit will transmit either operational data or history buffer data depending on the "History Buffer Request" on ISN PAGE 10. Data must be transmitted for every ISN page under feature 54. If there is no value to be sent to a particular page, a zero will be sent. Tables 34 and 35 show the data values and page listings for this unit.

ISN PAGES listed are ENG PAGE REFERENCES and must be decoded to the corresponding PAGE REF point map related to the communications protocol type utilized. The latest point map information is listed on the Johnson Controls Group Equipment Integration website.

TABLE 34 – ISN TRANSMITTED DATA

ISN PAGE	CHARACTER	TYPE	DATA
P11	8-11	Analog	Leaving Chilled Liquid Temp.
P12	12-15	Analog	Return Chilled Liquid Temp.
P13	16-19	Analog	----
P14	20-23	Analog	----
P15	24-27	Analog	SYS 1 Suction Temp. (EEV Only)
P16	28-31	Analog	Ambient Air Temp.
P17	32-35	Analog	SYS 1 Suction Superheat (EEV Only)
P18	36-39	Analog	SYS 1 Run Time (Seconds)
P19	40-43	Analog	SYS 1 Suction Pressure
P20	44-47	Analog	SYS 1 Discharge Pressure
P21	48-51	Analog	----
P22	52-55	Analog	----
P23	56-59	Analog	SYS 1 EEV Output % (EEV Only)
P24	60-63	Analog	SYS 1 Anti-Recycle Timer
P25	64-67	Analog	Anti-Coincidence Timer
P26	68-71	Analog	SYS 2 Suction Temp. (EEV Only)
P27	72-75	Analog	SYS 2 Run Time (Seconds)
P28	76-79	Analog	SYS 2 Suction Pressure
P29	80-83	Analog	SYS 2 Discharge Pressure
P30	84-87	Analog	----
P31	88-91	Analog	----
P32	92-95	Analog	SYS 2 Suction Superheat (EEV Only)
P33	96-99	Analog	SYS 2 Anti-Recycle Timer
P34	100-103	Analog	SYS 2 EEV Output % (EEV Only)
P35	104-107	Analog	# of Compressors
P36	108	Digital	SYS 1 Alarm
P37	109	Digital	SYS 2 Alarm

ISN CONTROL (CON'T)

TABLE 34 – ISN TRANSMITTED DATA (CONT'D)

ISN PAGE	CHARACTER	TYPE	DATA
P38	110	Digital	Evaporator Heater Status
P39	111	Digital	Evaporator Pump Status
P40	112	Digital	SYS 1 Comp. 2 Run
P41	113	Digital	SYS 2 Comp. 2 Run
P42	114	Digital	SYS 1 Liquid Line Solenoid Valve or EEV Pilot Solenoid
P43	115	Digital	SYS 1 Hot Gas Bypass Valve
P44	116	Digital	SYS 1 Comp. 2 Run
P45	117	Digital	SYS 2 Comp. 2 Run
P46	118	Digital	SYS 2 Liquid Line Solenoid Valve or EEV Pilot Solenoid
P47	119	Digital	Lead System (0=SYS 1, 1=SYS 2)
P48	120	Digital	SYS 1 Comp.3 Run
P49	121	Digital	SYS 2 Comp. 3 Run
P50	122	Digital	Chilled Liquid Type (0=Water, 1=Glycol)
P51	123	Digital	Ambient Control Mode (0=Std. Ambient, 1=Low Ambient)
P52	124	Digital	Local/Remote Control Mode (0=Local, 1=Remote)
P53	125	Digital	Units (0=Imperial, 1= SI)
P54	126	Digital	Lead/Lag Control Mode (0=Manual,1= Remote)
P55	127	Digital	----
P56	128	Coded	* SYS 1 Operational Code
P57	129	Coded	* SYS 1 Fault Code
P58	130	Coded	* SYS 2 Operational Code
P59	131	Coded	* SYS 2 Fault Code
P60	132	Coded	----
P61	133	Coded	SYS 1 Condenser Fan Stage
P62	134	Coded	----
P63	135	Coded	SYS 2 Condenser Fan Stage
P64	136	Coded	----
P65	137	Coded	Unit Control Mode (0=Leaving Water, 1=Return Water, 2=Discharge Air, 3=Suction Press., 4=Cooling 5=Heating)
P66	138-141	Analog	Anti-Recycle Timer
P67	142-145	Analog	Leaving Chilled Liquid Temp. Cutout
P68	146-149	Analog	Low Ambient Temp. Cutout
P69	150-153	Analog	----
P70	154-157	Analog	Low Suction Pressure Cutout
P71	158-161	Analog	High Discharge Pressure Cutout
P72	162-165	Analog	Setpoint
P73	166-169	Analog	Cooling Range
P74	170-173	Analog	----
P75	174-177	Analog	----
P76	178-181	Analog	SYS 1 Discharge Temp. (EEV Only-Optional)
P77	182-185	Analog	SYS 1 Discharge Superheat (EEV Only- Optional)
P78	186-189	Analog	SYS 2 Discharge Temp. (EEV Only- Optional)
P79	190-193	Analog	SYS 2 Discharge Superheat (EEV Only- Optional)
P80	194	Digital	----
P81	195	Digital	----
P82	196	Digital	----
P83	197	Digital	----
P84	198	Digital	----

* The operational and fault codes sent to pages 56 through 59 are defined in Table 35. Note that this table of fault and operational codes is for all DX products.

ISN CONTROL (CON'T)

TABLE 35 – ISN OPERATIONAL AND FAULT CODES

P56/58	OPERATIONAL CODE	P57/59	FAULT CODE
0	NO ABNORMAL CONDITION	**0**	NO FAULT
1	UNIT SWITCH OFF	**1**	VAC UNDER VOLTAGE
2	SYSTEM SWITCH OFF	**2**	LOW AMBIENT TEMPERATURE
3	LOCK-OUT	**3**	HIGH AMBIENT TEMPERATURE
4	UNIT FAULT	**4**	LOW LEAVING CHILLED LIQUID TEMP
5	SYSTEM FAULT	**5**	HIGH DISCHARGE PRESSURE
6	REMOTE SHUTDOWN	**6**	HIGH DIFFERENTIAL OIL PRESSURE
7	DAILY SCHEDULE SHUTDOWN	**7**	LOW SUCTION PRESSURE
8	NO RUN PERMISSIVE	**8**	HIGH MOTOR CURRENT
9	NO COOL LOAD	**9**	LLSV NOT ON
10	ANTI-COINCIDENCE TIMER ACTIVE	**10**	LOW BATTERY WARNING
11	ANTI-RECYCLE TIMER ACTIVE	**11**	HIGH OIL TEMPERATURE
12	MANUAL OVERRIDE	**12**	HIGH DISCHARGE TEMPERATE
13	SUCTION LIMITING	**13**	IMPROPER PHASE ROTATION
14	DISCHARGE LIMITING	**14**	LOW MOTOR CURRENT /MP / HPCO
15	CURRENT LIMITING	**15**	MOTOR CURRENT UNBALANCED
16	LOAD LIMITING	**16**	LOW DIFFERENTIAL OIL PRESSURE
17	COMPRESSOR(S) RUNNING	**17**	GROUND FAULT
18	HEAT PUMP LOAD LIMITING	**18**	MP /HPCO
		19	LOW EVAPORATOR TEMPERATURE
		20	INCORRECT REFRIGERANT PROGRAMMED
		21 REQUIRED	POWER FAILURE, MANUAL RESET
		22	UNIT MOTOR CURRENT
		23	LOW SUPERHEAT
		24	SENSOR FAIL
		25	DISCHARGE INHIBIT
		26	MP/HPCO INHIBIT
		27	PUMP TRIP
		28	PUMP FAIL MAKE FLOW

BACNET AND MODBUS DATA COMMUNICATION

Data can be read and in some cases modified using a serial communication BACnet or Modbus network connection. This information allows communications of chiller operating parameters and external control changes to setpoint, load limiting, and start/stop commands.

In some cases, BACnet parameters may need to be modified. Modification is accomplished by pressing the PROGRAM, DOWN ARROW, DOWN ARROW, DOWN ARROW, DOWN ARROW, and ENTER keys in sequence. The list below shows the displays for the values that may be modified:

DE MODIFIER ADDRESS XXXXX	P2 PROTOCOL XXXXXXXXXX
DE MODIFIER OFFSET XX	P2 MANUAL MAC ADDRESS XXX
P1 PROTOCOL XXXXXX	P2 BAUD RATE XXXXX
P1 MANUAL MAC ADDRESS XXX	P2 PARITY XXXXX
P1 BAUD RATE XXXXX	P2 STOP BITS X
P1 PARITY XXXXX	REAL TIME ERROR ## RESET 1 = YES, 0 = NO 0
P1 STOP BITS X	

The table below shows the minimum, maximum, and default values.

TABLE 36 – MINIMUM, MAXIMUM AND DEFAULT VALUES			
DESCRIPTION	**MINIMUM**	**MAXIMUM**	**DEFAULT**
DE MODIFIER ADDRESS	-1	41943	-1
DE MODIFIER OFFSET	-1	99	-1
P1 BAUD RATE	1200	76800	4800
	1200, 4800, 9600, 19200, 38400, 76800, AUTO SELECTABLE		
P2 BAUD RATE	1200	57600	1200
	1200, 4800, 9600, 19200, 38400, 57600 SELECTABLE		
P1, P2 MANUAL MAC ADDRESS	-1	127	-1
P1, P2 PARITY	NONE	IGNORE	NONE
	NONE, EVEN, ODD, IGNORE SELECTABLE		
P1 PROTOCOL	BACNET	API	BACNET
	BACNET, API SELECTABLE		
P2 PROTOCOL	TERMINAL	MODBUS CLIENT	API
	TERMINAL, MODBUS IO, MODBUS SERVER, API, MODBUS CLIENT SELECTABLE		
P1, P2 STOP BITS	1	2	1
RESET REAL TIME ERROR	NO	YES	NO

The table below shows the real time error numbers and a description of each.

TABLE 37 – REAL TIME ERROR NUMBERS	
ERROR NUMBER (##)	**DESCRIPTION**
0	ALL OK
1	DATUM TYPE OK TEST FAILED
2	ENGLISH TEXT TOO LONG
3	FLOATING POINT EXCEPTION
4	GET PACKET FAILED
5	GET TYPE FAILED
6	INVALID UNIT CONVERSION
7	INVALID HARDWARE SELECTION
8	REAL TIME FAULT
9	SPANISH TEXT TOO LONG
10	THREAD EXITED
11	THREAD FAILED
12	THREAD STALLED
13	IO BOARD RESET
14	BRAM INVALID
15	BACNET SETUP FAILED

Chiller data that can be read and modified using specific Modbus Register Addresses; and the data associated with the addresses, is outlined in the following description:

SERIAL COMMUNICATION ANALOG VALUE DATA

This data can be read and modified using a BACnet or Modbus network connection. The Modbus Register Address for these points is 1025 + AV #.

AV	BACNET NAME	ANALOG VALUE DESCRIPTION
1	REM_SETP	SETPOINT COOLING SETPOINT (HP ONLY), 99 = AUTO (40 °F - 70 °F)
2	SP_REM_SP_S1	SYS 1 SETPOINT (SUCTION PRESSURE CONTROL)
3	LOAD_LIMIT	LOAD LIMIT STAGE (0, 1, 2)
4	REM_CR	COOLING RANGE (DAT MODE ONLY)
5	SP_REM_SP_S2	SYS 2 SETPOINT (SUCTION PRESSURE CONTROL)
6	REM_SP_HEAT	HEATING SETPOINT (HP ONLY) 99 = AUTO (95 °F - 122 °F)
7	HP_MODE	MODE (HP ONLY) (0 = PANEL, 1 = COOLING, 2 = HEATING)

SERIAL COMMUNICATION BINARY VALUE DATA

This data can be read and modified using a BACnet or Modbus network connection. The Modbus Register Address for these points is 1537 + BV #.

BV	BACNET NAME	BINARY VALUE DESCRIPTION
1	START_STOP	START / STOP COMMAND
2	SS_SYS1	SYS 1 START / STOP COMMAND (SUCTION PRESSURE CONTROL)
3	SS_SYS2	SYS 2 START / STOP COMMAND (SUCTION PRESSURE CONTROL)

SERIAL COMMUNICATION ANALOG INPUT DATA

This data can be read using a BACnet or Modbus network connection and can NOT be modified using this connection. The Modbus Register Address for these points is 513 + AI #.

AI	BACNET NAME	ANALOG INPUT DESCRIPTION
1	LCHLT	LEAVING CHILLED LIQUID TEMP
2	RCHLT	RETURN CHILLED LIQUID TEMP
3	DAT	DISCHARGE AIR TEMP (COND UNIT ONLY)
4	S1_SUCT_TEMP	SYS 1 SUCTION TEMPERATURE (EEV AND COND UNIT ONLY)
5	OAT	AMBIENT AIR TEMPERATURE
6	S1_SUCT_SH	SYS 1 SUCTION SUPERHEAT (EEV ONLY)
7	S1_RUN_TIME	SYS 1 RUN TIME (SECONDS)
8	S1_SUCT_PR	SYS 1 SUCTION PRESSURE
9	S1_DSCH_PR	SYS 1 DISCHARGE PRESSURE
10	S1_SUCT TEMP	SYS 1 SUCTION TEMPERATURE
11	S1_CIR_TEMP	SYS 1 COOLER INLET REFRIGERANT TEMPERATURE (R-407C ONLY)
12	S1_DEF_TEMP	SYS 1 DEFROST TEMPERATURE (HP ONLY)

Continued on next page

Continued from previous page

AI	BACNET NAME	ANALOG INPUT DESCRIPTION
13	S1_EEV_OUT	SYS 1 EEV OUTPUT % (EEV ONLY)
14	S1_AR_TIMER	SYS 1 ANTI-RECYCLE TIMER
15	AC_TIMER	ANTI-COINCIDENT TIMER
16	S2_SUCT_TEMP	SYS 2 SUCTION TEMPERATURE (EEV AND COND UNIT ONLY)
17	S2_RUN_TIME	SYS 2 RUN TIME (SECONDS)
18	S2_SUCT_PR	SYS 2 SUCTION PRESSURE
19	S2_DSCH_PR	SYS 2 DISCHARGE PRESSURE
20	S2_SUCT_TEMP	SYS 2 SUCTION TEMPERATURE
21	S2_CIR_TEMP	SYS 2 COOLER INLET REFRIGERANT TEMPERATURE (R407C ONLY)
22	S2_DEF_TEMP	SYS 2 DEFROST TEMPERATURE (HP ONLY)
23	S2_SUCT_SH	SYS 2 SUCTION SUPERHEAT (EEV ONLY)
24	S2_AR_TIMER	SYS 2 ANTI-RECYCLE TIMER
25	S2_EEV_OUT	SYS 2 EEV OUTPUT % (EEV ONLY)
26	NUM_COMPS	NUMBER OF COMPRESSORS
27	S1_OP_CODE	SYS 1 OPERATIONAL CODE
28	S1_FLT_CODE	SYS 1 FAULT CODE
29	S2_OP_CODE	SYS 2 OPERATIONAL CODE
30	S2_FLT_CODE	SYS 2 FAULT CODE
31	S1_DBG_CODE	SYS 1 DEBUG CODE
32	S1_FAN_STAGE	SYS 1 CONDENSER FAN STAGE
33	S2_DBG_CODE	SYS 2 DEBUG CODE
34	S2_FAN_STAGE	SYS 2 CONDENSER FAN STAGE
35	CONTROL_M0DE	UNIT CONTROL MODE (1=LEAVING WATER, 2=RETURN WATER. 3=DISCHARGE AIR, 4=SUCTION PRESS, 5=COOLING, 6=HEATING)
36	AR_TIME	ANTI-RECYCLE TIME (PROGRAMMED)
37	LCHLT_CUT	LEAVING CHILLED LIQUID TEMP CUTOUT
38	LOW_AMB_CUT	LOW AMBIENT TEMPERATURE CUTOUT
39	SUCT_P_CO_HT	LOW SUCTION PRESSURE CUTOUT HEATING (HP ONLY)
40	L_SUCT_P_CO	LOW SUCTION PRESSURE CUTOUT (COOLING ON HP UNITS)
41	H_DSCH_P_CO	HIGH DISCHARGE PRESSURE CUTOUT
42	COOL_SETP	SETPOINT
43	SP_SETP_S1	SETPOINT 1 (SP CONTROL)
44	CONTROL_RG	COOLING RANGE
45	SP_CTL_RG_S1	COOLING RANGE 1 (SP CONTROL)
46	SP_SETP_S2	SETPOINT 2 (SP CONTROL)
47	HEAT_SETP	HEATING SETPOINT (HP ONLY)
48	SP_CTL_RG_S2	COOLING RANGE 2 (SP CONTROL)
49	HEAT_RANGE	HEATING RANGE (HP ONLY)
50	S1_DSCH_TEMP	SYS 1 DISCHARGE TEMPERATURE (EEV ONLY)
51	S1_DSCH_SH	SYS 1 DISCHARGE SUPERHEAT (EEV ONLY)
52	S2_DSCH_TEMP	SYS 2 DISCHARGE TEMPERATURE (EEV ONLY)
53	S2_DSCH_SH	SYS 2 DISCHARGE SUPERHEAT (EEV ONLY)

SERIAL COMMUNICATION BINARY INPUT DATA

This data can be read using a BACnet or Modbus network connection and can NOT be modified using this connection. The Modbus Register Address for these points is 1281 + BI #.

BI	BACNET NAME	BINARY INPUT DESCRIPTION
1	S1_ALARM	SYS 1 ALARM
2	S2_ALARM	SYS 2 ALARM
3	EVAP_HTR	EVAPORATOR HEATER STATUS
4	EVAP_PUMP	EVAPORATOR PUMP STATUS
5	SI_C1_RUN	SYS COMP 1 RUN
6	S2_C1_RUN	SYS 2 COMP 1 RUN
7	S1_LLSV	SYS 1 LIQUID LINE SOLENOID VALVE
8	S1_MODE_SV	SYS 1 MODE SOLENOID VALVE (HP ONLY)
9	S1_HGBV	SYS 1 HOT GAS BYPASS VALVE
10	S1_BHS	BIVALENT HEAT SOURCE (HP ONLY)
11	S1_C2_RUN	SYS 1 COMP 2 RUN
12	S2_C2_RUN	SYS 2 COMP 2 RUN
13	S2_LLSV	SYS 2 LIQUID LINE SOLENOID VALVE
14	S2_MODE_SV	SYS 2 MODE SOLENOID VALVE (HP ONLY)
15	LEAD_SYS	LEAD SYSTEM (0 = SYS 1, 1 = SYS 2)
16	S1_C3_RUN	SYS 1 COMP 3 RUN
17	S2_C3_RUN	SYS 2 COMP 3 RUN
18	CH_LIQ_TYPE	CHILLED LIQUID TYPE (0 = WATER, 1 = GLYCOL)
19	AMB_MODE	AMBIENT CONTROL MODE (O = STD AMB, 1 = LOW AMB)
20	CNTL_MODE	LOCAL / REMOTE CONTROL MODE (0 = LOCAL, 1 = REMOTE)
21	DATA_UNIT	UNITS (0 = IMPERIAL, 1 = SI)
22	AUTO_LL	LEAD / LAG CONTROL MODE (0 = MANUAL, 1 = AUTO)
23	S2_HGBV	SYS 2 HOT GAS BYPASS VALVE

NOTES

©2008 Johnson Controls, Inc.

P.O. Box 423, Milwaukee, WI 53203
www.johnsoncontrols.com

Printed in USA 150.66-NM1 (708)
Supersedes 150.66-NM1 (1005)